VOL. 4. NO. 5. MAY, 1906.

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD. THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS REVIEW.

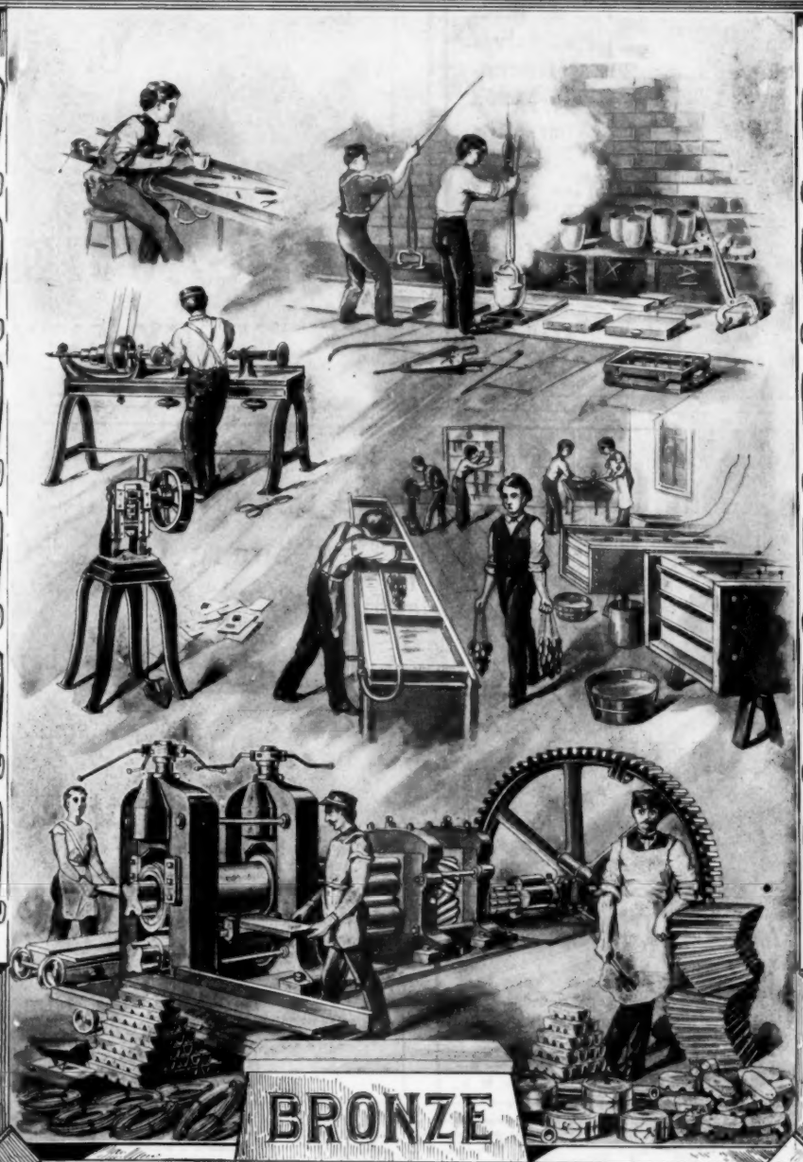
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

ALUMINUM · COPPER · NICKEL · TIN · SILVER · LEAD · GOLD · ZINC · BRONZE

METALLOGRAPHY · BRASS · METALLURGY

MELTING · REFINING · ALLOYING · CASTING · FOUNDING · FINISHING

ROLLING · DRAWING · STAMPING · SPINNING · PLATING · POLISHING



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"LABOR CONQUERS EVERYTHING"

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THE METAL INDUSTRY
EMBRACING
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
AND
ELECTRO PLATERS REVIEW

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ADVERTISING RATES ON APPLICATION.

ENTERED FEBRUARY 10, 1903, AT NEW YORK, N. Y., AS SECOND CLASS MATTER UNDER ACT OF CONGRESS MARCH 3, 1879.

SAN FRANCISCO AND THE METAL INDUSTRY.

When the echoes of the San Francisco earthquake had rolled away and first aid had been rushed to the injured and to the homeless, the business community naturally turned their attention to their financial interests on the Pacific and examined their accounts to asecrtain the loss and damage from this appalling disaster. It may be said that the first move by every manufacturer was to put a stop-order on all shipments. There were no business houses left in San Francisco to ship to. The next problem was whether or not to go on with the unfinished orders or cancel all until advised to proceed. It is probable that every manufacturer had his own individual policy in regard to this phase of the question, but one of the largest brass and copper rolling mills with which we are acquainted decided at once to complete all San Francisco orders that the goods might be ready for immediate shipment as soon as they received word from their agents. If no word should ever come, they knew that in the present tremendous demand for all brass and copper products that they could dispose of the goods in due course of time. Many other manufacturers probably have taken the same course, while others may have turned their energies to the more pressing orders nearer at home.

Regarding the extent of the non-ferrous metal industry in San Francisco, there were, of course, no rolling mills there, for there are none west of the Mississippi River, with the single exception of a zinc mill, consequently all sheet, rod, wire and tubing delivered at the Golden Gate was sent there from the eastern and middle States. While the consumption of these products was not large compared with that of the Atlantic Seaboard, trade on the Pacific Coast was growing and San Francisco was the distributing center for the rolling mill products of the East. The city itself was a manufacturer of metal goods to a considerable extent, for a review of the firms engaged in the metal business there shows that there were at least 150, divided as follows: Brass founders, 25; coppersmiths, 10; silversmiths, 8; platers, 22; manufacturing jewelers, 59; metal dealers, smelters and refiners, 26, and probably many more firms of kindred interest. How many of these will resume business only time can tell, but it is safe to assume that with the spirit of re-build-

ing which is so much in evidence and the generosity of the land pouring into the stricken city that the majority at least will make an effort to continue and many new firms will start in business.

The capacity of the city to consume the precious metals may be judged by the statement that the largest retail house there, and which to San Francisco was what Tiffany is to New York, carried a stock of $2,000,000 in silverware, bronzes and jewelry. The same firm which was also manufacturing silversmiths ordered 20,000 ounces of silver every month from one eastern rolling mill. As it will take some time to rebuild the stores and that it will also be a period of months before the people have a need for luxuries, the silversmiths and precious metal trade believe that their San Francisco business will be affected adversely for nearly a year.

The immediate prospective metal demand at the Golden Gate seems to be steel. It is to be steel construction, earthquake proof, but when the steel orders have been placed there will come the orders for brass, copper, tin, aluminum, zinc, nickel and bronze, in all forms, from the ingot up, to make the necessary fittings that go with building construction. All of these metals will have to be sent from outside of the State of California, for while that State produces and exports silver, gold and lead, it has not produced in any quantity the rest of the non-ferrous metals. The metal trades may, therefore, look forward to an active demand for their products when construction takes the place of desolation and San Francisco is itself again.

THE NEW ROLLING MILLS.

There has been such a number of new American metal rolling mills projected within the last few months—THE METAL INDUSTRY reporting at least six in that time—that a statement of the progress made to date in the construction of these new mills will doubtless prove interesting.

One of the first mills projected was the Atlan Copper and Brass Company of Pittsburg, Pa., incorrectly mentioned in some papers as the Atlas. This company was organized by L. G. Scofil, formerly of Wheeling, W. Va., and incorporated under the laws of the State of Delaware with a capital stock of $750,000. They have decided to locate their plant at Trafford City, Pa., but no attempt has been made to build a plant nor so far as we are able to ascertain no plans have been drawn for the building of one, the organizers giving all their attention to date to raising money, and have an office in Pittsburg.

The next mill announcement was that of the Wallingford Metal Company of Wallingford, Conn. The name of this corporation has since been changed to the Waterbury Rolling Mills, Inc., and they have secured a plot of land in Waterbury and will build there. The plans have been prepared for this mill and construction work is expected to start this spring. It was their original intention to make a specialty of German silver.

The third new mill reported in the columns of THE METAL INDUSTRY was the Western Copper Manufacturing Company, which was to expend $750,000 on a plant at Indiana Harbor, Ill. E. C. Potter, son of O. W. Potter, a Chicago banker, was the promoter of this enterprise and took offices in Chicago. So far as we have been able to learn no attempt has been made on any construction work of this mill.

The fourth mill reported was the United States Brass and Copper Corporation, incorporated under the laws of the State of Delaware, for $1,000,000. Their plan was to build a brass and copper rolling mill at New Castle, Pa., which is about 50 miles north of Pittsburg, and they took offices at 42 Broadway, New York City. The latest reports from this company say that no construction work has been begun and the company are still engaged in the financial end of their undertaking.

The Michigan Copper and Brass Company of Detroit, Mich., was the next new mill, the announcement of the organization of which was made last December. This mill was organized by Jeremiah Howe, a rolling mill superintendent of experience, and has responsible people connected with it. The organization of the corporation was completed some months ago, a site procured, plans drawn, and they have already begun to build. Barring earthquakes and other unforeseen disasters, this mill will undoubtedly be finished and in operation within the shortest possible time that it takes to complete such enterprises. The capital stock of this company is $1,000.000.

Announcement was made early in the year that the Pittsburg Reduction Company, whose rolling mill is at present located at New Kensington, 18 miles from Pittsburg, but whose aluminum producing plants are situated at several of the water power centers, had bought land at Niagara Falls, N. Y., and Massena, N. Y., and was to put up a new rolling mill at one or both of those places. It is true that the company has bought more land at these points, but no definite statement about their plans of the new rolling mills is obtainable on account of the absence abroad of the manager of the company. It is naturally expected that this aluminum company will build mills at some point in the near future on account of the scarcity of aluminum sheet, rod, wire and tubing. The company have been constantly enlarging their ingot works and present rolling mill to take care of the market, but still the demand is in excess of the supply. It is, therefore, reasonable to expect that new mills will be built, but whether at the water power centers, where the reduction works are situated, or at New Kensington, where their present rolling mill is, no statement can be made at the present time.

The latest rolling mill to be reported is the one fathered by the National Conduit and Cable Company, of New York, about which little authentic information is obtainable, as the plans are in such an immature state. The fact that the mill is projected by such a large and wealthy corporation and is under the immediate supervision of practical men gives credence to the belief that it will be completed and be a good one.

Besides the seven new mills mentioned above, most all of the old mills have been making efforts to increase their capacity, and among the extensions recently noted in the columns of THE METAL INDUSTRY, are the new tube plant for the Chicago Brass Company of Kenosha, Wis., the increase in the capacity of the Phœnix Tube Company of Brooklyn, N. Y., and an enlargement in the equipment of the Riverside Metal Company of Riverside, Burlington County, N. J. The extensions noted of the older mills and the projected number of new mills indicate what a demand there is at the present time for the non-ferrous metals in the form of sheet, rod, wire and tubing, and also emphasizes the general prosperous condition of the rolling mill industry.

THE PROBLEM OF OXIDATION IN BRASS FOUNDRY PRACTICE.

By Percy Longmuir.

In the May and June (1905) issues of The Metal Industry the author showed the influence of one variable, namely, that of the casting temperature on the properties of alloys. In normal brass-foundry practice the question of casting temperature is likely to prove the greatest of all variables, inasmuch as the temperature steadily falls as a series of boxes are being cast from one crucible or ladle. There are, however, other factors which may creep in and whilst undetected give rise to mysterious variation. Of these the most prominent is that of oxidation during melting, a factor which has led to annoyance in numberless cases. The difficulty of producing copper castings is one aspect of this factor, while another, not so generally recognized, is found in remelting naval brass, manganese bronze and kindred alloys. Thus if a crucible of all manganese bronze is melted, no matter how carefully, the resulting castings will not come up to the standard. This failure is due entirely to oxidation.

Taking metallic copper first, the affinity of this metal for oxygen is well known and may be exemplified by heating turnings to a full red heat in the air. On cooling, the bulk of the turnings will have been converted into oxides. If this occurs in the solid, evidently in molten copper in contact with air, that is diluted oxygen, oxide will be formed and will have a corresponding effect on the mass of metal. If this oxide would float on the top of the molten copper, then obviously the crucible could be skimmed before casting and oxide-free castings would be obtained. Unfortunately, however, the oxide does not float on the top and skimming will not remedy the evil.

From the foundry point of view comparatively few studies have been made as to the direct influence of oxygen. From what is known we may take it that the oxygen combinces with copper forming cuprous oxide. The distribution of this cuprous oxide is a point of some moment. Thus when only a small amount is present the oxide is dissolved by the metallic copper, but when an excess is present the oxide appears as a structural entity. Whilst this may not be of very direct interest to the brass founder it will not be altogether waste time to briefly glance at the known scientific aspect of the case.

Heyn and Bauer have recently shown that oxygen-free copper solidifies at a temperature of 1084° C. As the contents of oxygen increases, the solidification temperature steadily falls, until, when 3.5% of cuprous oxide is reached, the mass solidifies at 1065° C. Whilst the solidification temperature is lowered by the presence of oxygen down to this point, it is worthy of note that further additions of oxygen raise the solidification point, which now increases with the amount of cuprous oxide present. The lower limit of 1065° C. therefore marks a "saturation point," that is, cuprous oxide to the extent of 3.5% is soluble in copper, but when this amount is exceeded, the oxide appears structurally free.

In a similar manner, but to an extent as yet unknown, silver, nickel and iron exhibit similar phenomena and, though difficult, this effect of oxygen demands most careful investigation. At the present moment the chief drawback lies in the difficulty of accurately estimating oxygen. The chemist who removes this difficulty will give a powerful incentive to research in a field of direct value to the practical brass founder.

Notwithstanding our limited knowledge, the presence of oxygen is certainly known to being injurious to any metal or alloy. In the case of copper castings many expedients have been resorted to in order to overcome the problem; in fact nearly every worker in this direction has his own particular cure. Naturally any method which proves effective under the conditions used must always be rigidly adhered to, but it is also worthy of note that a method successful under one set of conditions may prove a failure under other conditions.

The general advice in melting copper is "to melt under a layer of charcoal." This may be perfectly successful in the laboratory but in works practice it is inefficient. Practically it is impossible to melt copper in industrial weights, protected by a layer of charcoal alone and to produce oxygen-free castings. Charcoal is of course strongly reducing but it is not and cannot be effective down to the bottom of the crucible. Further it is also often stated that the crucible should be covered with a lid, advice which in its way is excellent, but as a precaution for obtaining oxide-free copper is useless. The fact is that theorists do not attach sufficient importance to the porosity of crucibles and it is of no earthly use to put on a lid to keep out gases which find a ready path through the walls of the crucible. The average crucible, when at a red heat, whilst perfectly metal-tight, is by no means gas tight and gases readily find a passage through the pores of the crucible.

A perfect reducing atmosphere may be obtained by means of a jacketed or double crucible. A small crucible is placed in a large one and the space between the two is filled with fine charcoal, a layer of which is placed also below and above the inner crucible. Both crucibles are covered with lids and after fusion the metal is allowed to solidify in the crucible. This means that the inner crucible is entirely surrounded by charcoal and therefore a reducing atmosphere is maintained irrespective of variations in the furnace.

Conditions such as these cannot hold in practice, the metal must be melted in single crucibles and poured into molds. Ingot copper as used in brass foundries always contains more or less oxygen in the form of oxide, whilst in heating further quantities of oxide are formed before the metal melts. After melting the charcoal cover becomes more or less effective and further absorption of oxide is determined by the melting atmosphere. As already stated, charcoal alone is not effective, a feature amply confirmed by experience in the foundry, but one which in cases of doubt may be readily tested by melting 30 or 40 lbs. of copper under charcoal and testing the resulting castings. Such tests will show that the castings do not possess the characteristic ductility of pure copper, a remark also applicable to the electrical properties.

From these well recognized facts has arisen the use of deoxidising agents employed to increase the efficiency of a charcoal covering. These agents comprise zinc, phosphorus, silicon, manganese, aluminum and certain of the rarer metals. In selecting any particular one of them, personal bias is often a guiding factor, but generally speaking zinc is used for what may be termed ordinary copper castings, as for example, copper hammers and the like. In this case copper is melted under charcoal and just before drawing the crucible about 2% of zinc is added. The zinc is gripped by tongs and pushed well into the metal; the greater part is oxidised and practically the whole of the oxygen in the copper is carried off as a volatile oxide of zinc.

Phosphorus is possibly the most frequently used deoxidizing agent and may be obtained in the form of phosphor-copper or phospor-tin. Stick phosphorus is dim-

cult to handle, is not altogether free from danger and not nearly so convenient as the alloy. Phosphor copper is used for copper castings and an addition of ½ lb. to 50 pounds of copper will give a theoretical phosphorus content of 0.15%. The actual amount of phosporus remaining will depend on the amount of oxygen in the copper. Assuming a loss of 50%, which is not excessive, the phosphorus in the castings will be 0.075%, an amount which under ordinary conditions is beneficial rather than injurious.

Manganese and silicon act in a similar manner to phosphorus and they may be used in either the cupro or ferro-form. Cupro-alloys should be used exclusively for copper castings but the ferros, provided they are high in manganese or silicon, may be used for alloys in which the introduction of iron is often an advantage.

Whilst phosphorus is possibly the favorite deoxidiser in the case of copper, manganese appears to take this place in the case of nickel. Thus in making nickel castings the metal is deoxidised by using a high ferro-manganese containing in the neighborhood of 80% manganese. In cases where the iron introduced is a disadvantage, metallic manganese made by the Goldschmidt process is substituted for the ferro alloy.

Of the metals used in brass founding copper, nickel and zinc are the most readily oxidised and in the case of copper and nickel the oxides formed remain in the metal and affect the properties to the extent present. To a somewhat less degree tin will also unite with oxygen and form an oxide which is retained by the metal. Furthermore, metallic tin will under certain conditions reduce copper oxide, but the oxide of tin which results, is retained by the alloy. Thus:

$$2\,Cu2O + Sn = 4\,Cu + Sn\,O2.$$

As in the case of copper oxide present in copper, so in the case of tin oxide present in an alloy, charcoal is only effective as a reducing agent when in actual contact. As the tin oxide does not float to the surface, that contact does not occur.

The oxide of zinc is emitted in the well-known fumes, and as the oxide is not retained by the metal it cannot affect the properties. Therefore in this case oxidation is less of an evil than in the case of copper and nickel. Whilst zinc does not retain oxide, nevertheless oxidation effects a lowering in the content of zinc, which is of importance where exact compositions are required.

The author's investigations show that no standard loss of zinc can be determined to fit all cases and furthermore, this loss is apparently unaffected by the amount of zinc present. The actual determining factor appears to be the highest temperature reached during fusion. This feature is illustrated in the following table:—

Alloy.	Highest Temperature.	Zinc Present in the Castings.	Loss of Zinc.
Red brass	1308° C.	10.2%	28.6%
Yellow brass	1182° C.	26.0%	26.1%
Gun metal	1173° C.	1.8%	27.7%
Muntz metal	1038° C.	40.5%	19.0%

The loss of zinc is calculated from the amount charged and that found in the castings and is expressed in terms of per cent. The total weight of alloy melted in the four cases was the same, that is, 50 pounds.

A practical application of the foregoing notes leads to some interesting conclusions. At the outset it was stated that manganese bronze scrap, if melted alone, would not yield castings of the desired quality. This fact is due to the oxidation of zinc and is of interest in all high tension bronzes. Experience shows that as zinc is added to copper the mechanical properties rise as the zinc is increased up to a certain point.

Copper, %.	Zinc, %.	Max. Stress Tons per sq. in.	Elongation % on 2".	Reduction of area, %.
89.6	10.2	12.0	26.0	30.0
73.0	26.0	12.0	40.0	35.0
58.6	40.5	10.0	15.0	16.0

These results represent averages obtained from a series of green sand castings and they show in a clear manner the effect of an increasing content of zinc. Experience has determined that the best combination of strength and ductility lies between 30 and 40% of zinc and within this range each increment of zinc raises the maximum stress and decreases the extensibility. The particular content of zinc is therefore selected to suit the properties desired in the casting. Naturally due precaution must be taken to see that the required amount of zinc is actually present in the final casting, in other words, the zinc loss should be determined and made good each time of melting.

Special bronzes, or more correctly special brasses, usually have a copper content in the vincinty of 60%, the remaining 40% being chiefly zinc with small amounts of other metals. Thus Naval Brass, copper 60, zinc 39, tin 1, represents an alloy of good mechanical properties. One per cent. of tin however represents a limit, for beyond this brittleness appears. The mechanical properties of a naval brass may be further improved by the introduction of nickel, iron, aluminum and manganese. The last metal is used chiefly as a deoxidiser and as a means of increasing the soundness and homogeneity of the alloy. The limit for tin has been given; nickel seldom exceeds 3% (in this class of brass), iron ranges up to 1½%, aluminum is present to the extent of about 0.5% and manganese may be entirely absent in the final alloy but in any case will seldom exceed 0.3%.

If a composition of the following order reaches the foundry:

Copper 60%,
Nickel 3%,
Tin 1%,
Zinc 36%,

with orders to reproduce it in the form of castings, the first feature in considering how to make up the alloy lies in allowing for oxidation. Such an alloy will be better if made at two meltings. The copper and nickel are melted together under charcoal and, when melted, deoxidised by the addition of about 0.5% of metallic manganese. The crucible is drawn, the tin added, the contents stirred before casting into ingot molds. For the second melting these ingots are melted in a crucible and, when liquid and at the right heat, the zinc is added, sufficient excess being introduced to allow for the zinc loss. When using scrap of this composition the zinc loss should be made good each time of melting. In this case metallic manganese is used owing to the fact that an iron-free alloy is desired.

With manganese bronzes in which iron is a constituent ferro-manganese is employed. These bronzes should also be made up by two meltings, but where the product is a specialty, three or even four meltings may be made. Generally the copper, iron, tin and aluminum are melted together first and deoxidised with manganese. As a rule the ferro-manganese employed will not add sufficient iron. This deficiency is made good by the use of mild steel scrap from which all rust should be removed.

The resulting alloy is then remelted and the zinc plus allowance for loss added. It may be noted that when any brass or bronze contains iron as a constituent, that iron must be alloyed with the other constituents and must not be present as free iron. In this respect manganese, apart from its virtue of deoxidising copper and iron, also appears to promote the alloying of iron with the other constituents.

The foregoing involves the exercise of some arithmetic in making the necessary allowance for loss and a perusal of the recent article by Mr. G. B. Waterhouse, pub-

lished in the January, 1906, issue of THE METAL INDUSTRY, will prove of assistance in this respect.

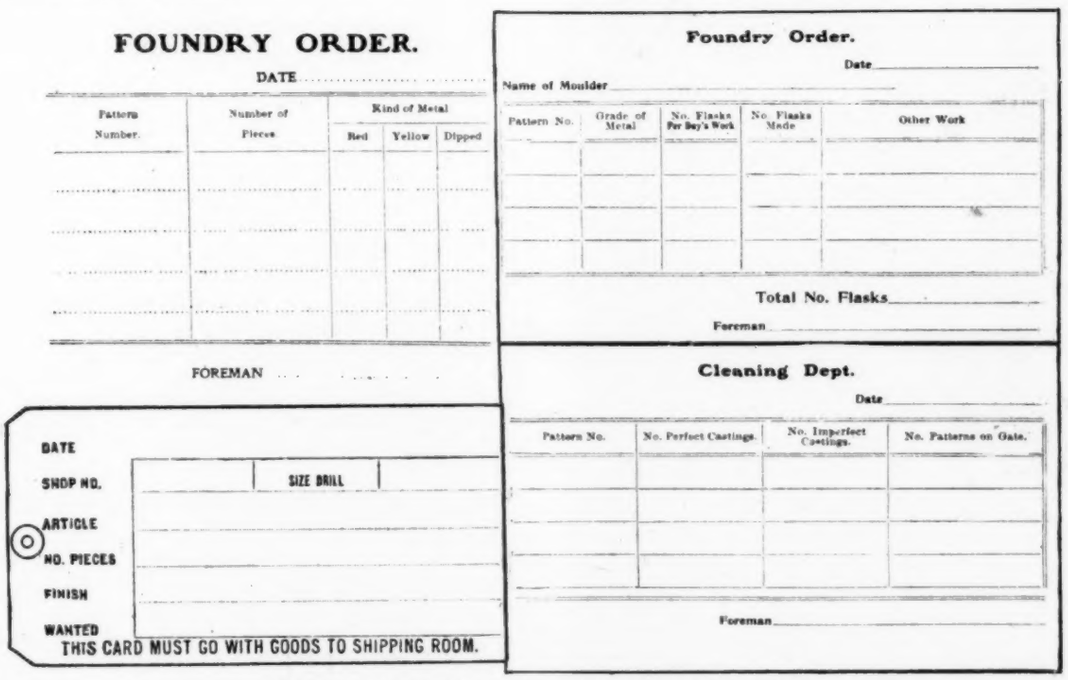
Finally it may be noted that the problem of oxidation in brass foundry practice is one well worth following up. Accurate and detailed knowledge is urgently needed; in addition to its scientific aspects the problem has definite financial and practical interests and systematic research will prove of high value to all concerned.

COST RECORDS IN THE BRASS FOUNDRY.

By T. D. SMITH.

Shop cost records are an essential thing in a brass shop, but they should be as simple as possible and at the same time efficient. There is no part of the shop where records should be kept if not in the foundry. It is always a matter of argument between the foundry boss and the finishing shop as to the number of pieces of a certain article which were cast and cannot be found. The writer was up against a proposition of this kind continually in a shop where thousands of small pieces were cast each day, and which were of such a nature that an over stock could not be kept.

A very simple and successful system was devised to cover the salient points. Right here it may be said that no system is of any use unless it is strictly enforced. The method is shown by the accompanying order blank, foundry report and shop ticket.



FOUNDRY ORDER.

DATE .....

Pattern Number.	Number of Pieces	Kind of Metal		
		Red	Yellow	Dipped

FOREMAN .....

Foundry Order.

Date_____

Name of Moulder_____

Pattern No.	Grade of Metal	No. Flasks Per Day's Work	No. Flasks Made	Other Work

Total No. Flasks_____

Foreman_____

DATE

SHOP NO. | SIZE DRILL

ARTICLE

NO. PIECES

FINISH

WANTED

THIS CARD MUST GO WITH GOODS TO SHIPPING ROOM.

Cleaning Dept.

Date_____

Pattern No.	No. Perfect Castings.	No. Imperfect Castings.	No. Patterns on Gate.

Foreman_____

ORDER BLANK, SHOP TICKET AND FOUNDRY REPORT.

The foundry reports were given to the molders each day. The orders were given in duplicate, one each to the foundry core room and casting cleaning department. The foundry foreman gave his order to the molder, who in turn filled out his report each day and signed it, when it was taken to the cleaning department. The castings were cleaned, inspected and counted, the deficient castings being reported to the molder and the count made good. The foreman of the cleaning department was held strictly to account for the actual number of pieces or good castings to fill his order. When he had the correct number of good castings he signed the foundry report of the molder and also his own order and returned both to the order clerk. By signing his own order and returning it with the foundry report the order clerk knew that the order was completed in the foundry.

The order clerk then made out the shop ticket for the job. On this ticket was the shop number of the piece, the number wanted, the finish, when wanted and any other details of the job. The color of the ticket was white for ordinary and red for rush orders. This ticket was given to the finishing foreman with the sample piece, which had a metal tag on it with the shop number. The ticket went with the job all through the factory to the shipping room, when the sample was returned to the sample room.

Once the routine of this system was established it put an end to all disagreeable arguments between the different departments and insured the proper amount of pieces in the shipping room. This system was used with success in a shop that had a capacity of ten thousand cocks and valves per day which were not standard goods, and on which one could not afford to make a mistake or to accumulate a stock of them.

The foundry report was a complete check on the bad casting molder, who could not get his slip back again once he had sent it through, for before he had found out that he was short the slip had gone back to the original sender. These slips were kept for thirty days, when the loss on each day's work was checked up, showing the total loss for the month and the corresponding rate or standing of the molder.

Manufacturers sending catalogues into foreign countries into which they want to export should bear in mind that catalogues should be printed in the language of the country to which they are sent. For countries which use the metric system all weights should be given in kilograms, and the dimensions in meters and centimeters. The prices should be given C. I. F. wherever it is possible.

BRONZE DOORS FOR THE PENNSYLVANIA STATE CAPITOL.

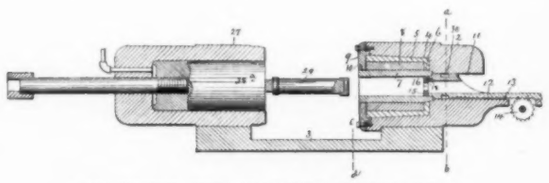
The accompanying illustration shows the bronze doors which have been cast for the South entrance of the Pennsylvania State Capitol Building at Harrisburg, Pa., by the Henry-Bonnard Bronze Company, New York. The doors were designed by Mr. Joseph M. Huston, the architect, and modelled by the sculptor, Mr. Otto S. Jahnsen. Each door was cast in one piece, front and back. This is a remarkable feat in bronze founding and the credit for it is due entirely to the skill and long practical experience of Mr. Eugene F. Aucaigne, the managing director of the Henry-Bonard Bronze Company.

THE BRONZE DOORS OF THE CAPITOL.

The usual mode of procedure is, of course, to cast the panels separately and to fit them together afterwards. In the present case, however, there was but one mold for each door, and from the pouring of the metal, one piece of bronze was the result, forming the door complete except the door knobs. The first doors to be cast in this way were the North doors for St. Bartholomew's Church, of which Mr. Philip Martiny was the sculptor and which caused a great deal of comment in architectural and sculptural circles at the time. The Harrisburg doors will make the third pair cast in this way. The height of each door is 20 feet 8⅞ inches, including the transom and arch, and they are nearly 10 feet wide.

MACHINE FOR MAKING METAL BARS OR RODS.

An apparatus which has recently been invented by J. W. Moshier, of Waterbury, Conn., and assigned to the Chase Rolling Mill Company, of Waterbury, Conn., has for its object the improvement of apparatus for the extrusion of metal bars or rods. As shown in the accompanying illustration, the apparatus consists of a cross head or block 2 mounted upon a base 3. In the forward end of the cross head there is provided a recess 4, slightly smaller in diameter at its inner than at its outer end. Into this recess is placed a hard metal cup-shaped pocket 5, the external walls of which correspond to the wall of the chamber 4, while the inner walls are straight. In the bottom of the pocket is a circular hole 6, through which extends the inner end of a steel sleeve 7. Between the sleeve and the inner wall of the pocket is a circular ring of packing 8 of insulating material.



MACHINE FOR MAKING METAL RODS.

A cap plate 9 holds the pockets and the non-conducting material 8 in place. Extending through the cross head from the inner end of the pocket 5 is a tubular passage 11, and entered into this passage is a die carrier 12, formed with teeth 13 in its under face. These teeth mesh with a pinion 14, by which the carrier can be moved back and forth. To the forward end of the carrier is secured a die 15. The die enters and closely fits the inner end of the sleeve 7. A plunger 29 is hinged to the forward end of the piston 28[A], within the cylinder 27 of the hydraulic ram. The plunger corresponds in external diameter with the internal diameter of the sleeve 7. In operation the sleeve 7 is heated and then a billet of metal, suitably heated, is introduced into it.

MANUFACTURING CHILLED IRON ROLLS.

The manufacture of chilled iron rolls is rather out of the line of non-ferrous metals to which THE METAL INDUSTRY is devoted, but in answer to an inquiry the process will be briefly described. Roll-making is a fine art and firms of long experience often find difficulty in making rolls that are satisfactory. Rolls are usually cast from air furnace metal, and the mixture may consist of warm or cold blast charcoal irons, old rolls, and even steel scrap is sometimes added. Some makers in the Pittsburg district melt in an open hearth furnace, a portion of the roof of the furnace being removable so that heavy roils may be lowered into it by means of a crane. Landon Carbonate, Muirkirk, Hinkle, Greenwood Cold Blast, etc., are favorite brands of charcoal iron with roll makers, and the grades used run from 3¼ to 7.

In order to ascertain when the proper composition is attained, which will give the required depth of chill in the roll, samples are taken from the melt at intervals. An ordinary fire-brick may be used as a pattern and sand rammed around it. The iron is poured into this mold and just before it sets a thin iron rod is thrust in the still liquid metal. When set, the test block is withdrawn from the sand by means of the iron rod, the sand removed by a shovel, and when down to a black heat it is cooled in water and broken. The fracture should be white or slightly mottled.

DEPOSITION OF GOLD, SILVER AND COPPER ON NON-METALLIC SURFACES.

By Edward E. Newton.

The art of depositing metals, such as gold, silver and copper, on prepared surfaces by the agency of electricity is still very interesting as the methods for doing such work have been improved upon from time to time. A great deal of the success in this class of work depends upon the operator, but after some practice most of the operations are very simple. It is possible to obtain a deposit of metal on almost every known substance, such as porcelain, glass, pottery, wood, ivory, celluloid, plaster casts, lace, flowers and even the human flesh. The writer has had in his possession at times some very beautiful specimens of this class of work which had been produced in different ways with the aid of nitrate of silver and phosphorus solution, lead and silver paint and also grahpite.

For glass, porcelain, pottery, ivory and celluloid the nitrate of silver solution is used where a completely covered surface is wanted. Lead and silver paint is used for partial ornamentation, the phosphorus solution for lace and flowers and graphite is successfully used where a deposit on wood, plaster casts and like work is required. In using the kiln or muffle experience is necessary in getting the proper heat and knowing when the work has been baked enough. Porcelain requires a much higher heat than glass, and therefore only one kind of work can be in the muffle at the same time. There is some very expensive work on the market to-day where two and three different metals have been deposited on one object, including some very fine effects with wire, leaves and flowers.

The old method for depositing on glass and other articles of a like nature by covering the object all over with metal and then etching out the parts not wanted is used very little today, in fact, only on certain classes of work. For the benefit of those who have never done this work the writer will describe in the following the cheapest process for accomplishing it. The article to receive the deposit should be thoroughly clean and potash is employed for this purpose in such cases where it will not injure the work. A good strong solution of potassium cyanide is used after the work has been in the potash. The work is then removed and scratch brushed. If the article is of such a shape that it can be filled with sand or shot, it is so much the better. The article is filled and at the top a cork or plug is used for sealing it, around the edges of which wax should be painted. Before sealing, a wire should be run through the cork which should be secured inside, leaving it about 12 inches long on the outside. It is well to keep the work in clean water until the solution is ready for use.

It should then be suspended from the rod, having a basin underneath to catch the solution as it is poured over the work until a coating has been formed upon the latter. This procedure will take about ten minutes. When this is done a wire must be connected to the one which has been run through the cork and allowed to rest lightly on the surface of the object which is to receive the deposit. Care should be taken that it does not rub or scratch over the surface and the work must not be touched with the hands. A very slow striking solution is used and then the article is immediately immersed in the regular plating solution where it remains until the desired deposit is obtained.

The solution is made up as follows: Dissolve ½ oz. of nitrate of silver in half a pint of water and keep it in a bottle marked No. 1. Dissolve four sticks of pure caustic potash, which is equal to about 2 oz., in one half pint of water and keep it separate, labeled No. 2. Dissolve 8 oz. of grape sugar in 16 oz. of water and when dissolved add 1 oz. of pure tartaric acid and ¼ oz. of absolute alcohol. This forms solution No. 3. Take equal parts of solution No. 1 and solution No. 2, mix them together well and add a sufficient quantity of ammonia to precipitate the silver. Shake well and then add 1-3 the quantity of the other solution already mixed. The solution is now ready for use and is poured on the work as described before. The photograph frame shown in the accompanying illustration is coated with a deposit over a celluloid surface which had been obtained with the above solution.

Another method for depositing gold or silver used on fine art work is carried out as follows: Neutral platinum chloride is triturated with enough lavender oil so as to form an easy flowing syrup. Of this preparation a scarcely perceptible film is applied by means of a small brush to the article to be ornamented. This work can

CELLULOID PICTURED FRAME COATED WITH SILVER.

hardly be done by the ordinary plater. When dry the article is heated in a muffle to a dark red heat. At this temperature the essential oil volatilizes partially while another portion is decomposed and reduces the platinum chloride to metallic platinum. The result is a coating of metal which has a finely polished surface. When cold the article is immediately immersed in a solution of nitric acid, which does not attack the platinum but removes all impurities that might make the surface dull. The article is then washed in clean water, the wire connected to the parts which are to receive the deposit and the article is immersed in a solution till the required deposit is obtained.

The cheapest method and the one which is used by the largest manufacturers at the present time is a paint composed of lead and silver mixed with oil of lavender. This paint can be bought ready made on the market, but I should advise any one doing this work to make his own, as it is very easily done. Girls are employed for painting the ornamentation and in a great many cases stencils are used, especially on the cheap

class of work. It can be easily seen how this work is turned out to-day at the price it is, when the way in which it is done now is compared to the method which was used a very few years ago, and considering the large quantities which are made at one time.

The silver paint can be prepared in the following manner: Take any amount, say 5 oz., of fine silver and dissolve in equal part of nitric acid and water, hot. When all is dissolved precipitate with salt, adding enough to throw down all the silver contained in the solution. Wash thoroughly to remove all acid and then add sulphuric acid enough to saturate the chloride thoroughly and insert pieces of sheet iron about ½ inch apart all through the chloride. Allow it to stand over night. The action of the acid from the iron will change the white chloride to a gray metallic powder of silver. Then remove what pieces of iron remain and wash in several waters to get rid of all acid and then dry.

Take two parts of the above silver powder and one part of borate of lead which can be purchased for about 75 cents a pound. Mix both with lavender oil, using enough to make an easy flowing paint. The silver paint is then ready for use. The painting must be done evenly and not too thick. When finished allow the paint to dry thoroughly and the article is then ready for the baking, which is done in a muffle. After the baking the work should be scratchbrushed, wires should be connected to the ornamented parts and the articles should be run from 12 to 18 hours according to the thickness of the deposit required. The deposit on wood and plaster casts can be produced best by the use of graphite on which a good deposit will adhere.

PLATING OF STEEL BUCKLES.

By Charles H. Proctor.

When buckles are plated they sometimes come out of the solution looking clean and nice; when they are lacquered, however, and the work lies around for several days, or perhaps a week, it commences to show spots all over. If some of these buckles are examined closely beneath a strong magnifying glass it is easy to note a great many minute holes, or pores, in the surface of the metal. As these pores expand on account of the heat and action of the plating solution some of the solution is retained when the work is taken out. This is usually the cause of the trouble mentioned above of the work spotting. As the solution is not entirely removed by washing it works up to the surface underneath the lacquer and produces stains. This trouble appears more especially in summer time, and when the air is very moist the stains will sometimes appear in a day.

In order to remedy this trouble the following procedure may be adopted: ½ ounce of commercial oil of vitriol should be added to 1 gallon of water, and a sufficiently large amount of the solution should be made up to accommodate the work in hand. After the articles are plated and washed they should be immersed for a few minutes in this solution; they should then be removed from the solution and washed. Another solution to be made up consists of ½ ounce of plater's compound, or whale oil soap, as it is commonly termed, added to 1 gallon of water. This solution should be kept at a low boiling temperature. After the articles have been immersed in the dilute acid solution they should be boiled for 10 to 15 minutes in the soap solution; they should then be washed and dried in sawdust. When the operation is carried out in this manner it should be possible to prevent the above-mentioned trouble of spotting.

PLATING NICKEL ON ZINC.

By Charles H. Proctor.

It is quite a difficult matter to plate nickel on zinc unless unusual care is exercised and a specially prepared bath is used. When the ordinary nickel bath is used, which is composed of the double salt of sulphate of nickel and sulphate of ammonia, blackish stains are apt to be produced and a considerable amount of cloudiness. This is especially the case if the solution is not entirely neutral, i. e.: free from acid. When zinc is plated in this manner the usual procedure consists in striking the articles in a cyanide of copper bath for several minutes. This bath should be quite warm. The articles are then washed well and re-nickeled for at least five minutes.

For silvering goods plated with nickel a warm striking solution may be used which consists of ¼ ounce chloride of silver, 6 ounces cyanide of potassium, to 1 gallon of water. A sufficiently strong current should be employed so that the articles are covered immediately with a film of silver. A sufficiently large anode surface should be used for this purpose. A copper bath should be used in connection with this method consisting of:

Acetate of copper	3½ oz.
Carbonate of soda	3½ oz.
Bi-sulphite of soda	
Cyanide of potassium	7½ oz.
Water	1 gal.

In order to prepare this solution the soda salts should be dissolved in one-third of the water, and the copper in another third of the water and added to the soda salts. The cyanide should be dissolved in the remaining water and the whole mixed thoroughly together. The anodes used with this bath should consist of soft sheet copper.

If a cloudy appearance still shows when the method described above has been used a specially prepared nickel bath will sometimes give good results. The composition of this bath should be as follows:

Chloride of nickel	17½ oz.
Sal ammoniac	17½ oz.
Water	3½ gal.

This solution should be used cold.

PROCESS FOR THE ELECTROLYTIC MANUFACTURE OF METAL TUBES.

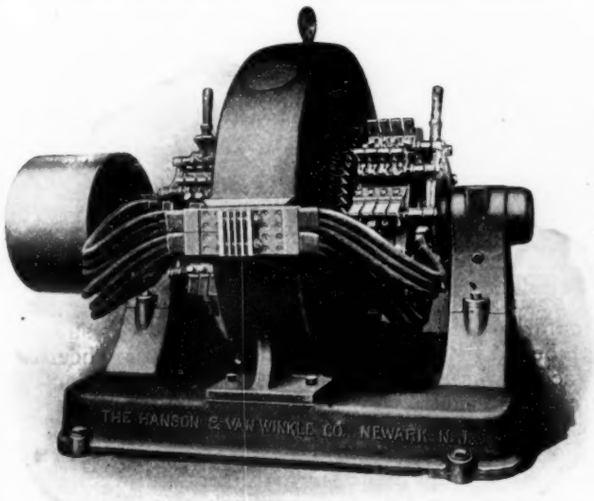
In the production of firmly adherent smooth electro deposits an addition is made to the bath liquor of solid bodies which will exert no chemical action upon the deposit, but which, when the solution is agitated and impinges against the cathode, are capable to remove the small bubbles of hydrogen which adhere to the cathode and to make the metallic deposits smooth. As such substances are mentioned sand, pumice stone, brick dust, wood flour, etc. However, all these substances have their drawbacks.

Mr. Otto Dieffenbach, of Darmstadt, Germany, has discovered an improvement which he patents by U. S. patent 817,419 of April 10, 1906. He found that the only substance capable of fulfilling all requirements is comminuted kieselguhr, or infusorial earth. It is carried up much more readily by the rotation of the cathode than the other substances and is harder and sharper edged, so that it can on this account more readily remove the bubbles of hydrogen which are deposited on the cathode. It is stated that from comparative tests of the strength of different kinds of copper tubes it has been ascertained that the tubes produced by the use of infusorial earth in the electrolyte are superior in regard to strength to all the others. It is claimed that the process can be used for the manufacture of tubes of any desired diameter for copper as well as for articles of nickel and other metals.

ELECTROPLATING DYNAMOS.

Specialization, which is evident in modern times in all branches of the manufacturing industry, is also the prime cause for the development of the plating dynamo. Greater familiarity on the part of the dynamo manufacturer with the needs of the plating industry has brought about the construction of types of electrical machinery specially designed for plating purposes. Their superiority over the older types of machines is indeed unquestionable. In the following a description will be given of a number of types built by various manufacturers.

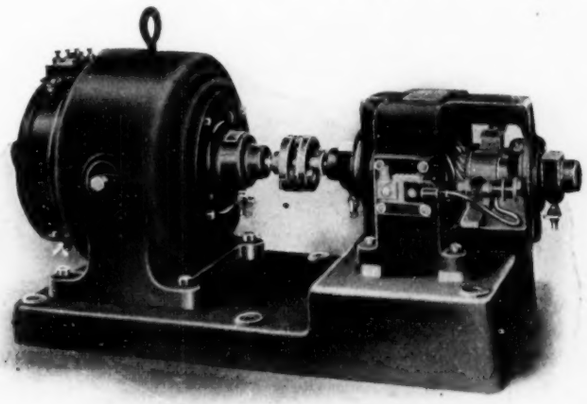
A very successful line of low voltage dynamos has for a number of years been placed on the market by the old established firm of Hanson and Van Winkle Company, of Newark, N. J. The firm builds dynamos of from 50 to 6,000 amperes capacity. The construction of the machines is either of the compound or the shunt wound type, while separate excitation is provided for dynamos of over 2,000 amperes capacity. The bipolar type of machine is compound-wound and has been very widely used in plating establishments. It is furnished in capacity from 50 up to 600 amperes. The multipolar dynamo, shown in the accompanying illustration, is built in 8 sizes ranging from 800 to 6,000 amperes and these machines are constructed either of the shunt or compound wound type or are provided with separate exaltation.



THE HANSON & VAN WINKLE DYNAMO.

The frame and the pole pieces are constructed of soft steel, a special soft grade of high permeability being used for the frame. The field coils are form wound and the armature is of the toothed type, the core being built up of thin soft steel discs. The commutator segments are forged from pure copper, have ample surface and are well ventilated. The machines can also stand momentary overloads of 25 per cent and overloads of 50 per cent for half an hour without showing an undue amount of heating. They run continuously on a full load with a rise of temperature of a maximum of 30 degrees in the winding and a lesser amount in the commutator. The firm also furnish motor generator sets in a number of sizes, which have met with considerable favor in places where electric power for driving purposes is available. The chief recommendation of electric driving of course is its flexibility, so that the dynamo can be located at any point in a shop independent of a line of shafting.

Within recent years the Zucker and Levett and Loeb Company, of New York, have also placed a line of plating dynamos on the market. These machines are shunt wound and for the larger sizes as well as in plants where according to the nature of the work the current has to be varied a number of times, a separately excited type is built. The exciter current is furnished by the regular 110 or 220 volt direct current circuit, which is generally used for light and power service. The armature coils are so constructed that they can easily be removed and replaced in case of accident, as they are all alike. The armature wires are soldered to the commutator and good electric contact is thus obtained. The bearings are also of generous dimensions. The magnetic circuit is constructed of steel instead of cast iron. The brush surface is also very large, thus allowing for wear and tear on the commutator. Ample brush surface is naturally of prime importance in a plating dynamo. The regular dynamos of this type, carried in stock, are wound for 5 and 6 volts. They are built of a capacity from 25 to 6,500 amperes. The firm also build motor generator sets, consisting of a dynamo with its appropriate size of driving motor mounted on a common base. An installation of this type is shown in the accompanying illustration.

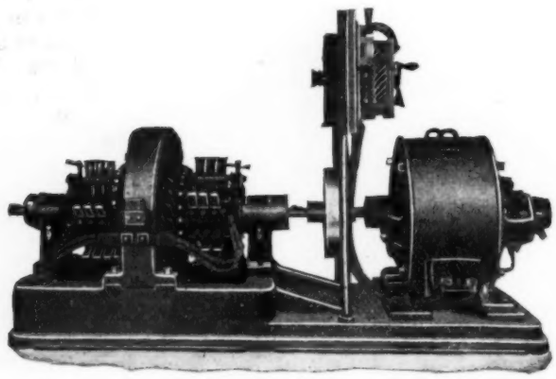


THE ZUCKER, LEVITT & LOEB DYNAMO.

Within the last three years a very complete line of low voltage dynamos has been placed on the market by Charles J. Bogue, New York. These machines range from 50 amperes at 5 volts to 8,000 amperes at 8 volts. They are made in eleven sizes of three different designs. Two of these designs are bipolar and the other multipolar. Machines of 1,000 amperes and above have two commutators and can be wound for one, two or three voltages, while standard machines are also wound for higher voltages with a corresponding reduction in ampere capacity. Machines separately excited with direct connection to an electric motor can be arranged by means of the field regulation of the dynamo and speed regulation of the motor to give any required voltage from zero to the maximum.

The designs of these machines are so arranged that the machines can stand heavy overload and have low contact losses. The machines are provided with a large commutator surface and have a shaft of crucible steel of large diameter. The armature is laminated and slotted and well ventilated. The field coils are removable and are

form wound. The bearings of the machine are of phosphor bronze and are of generous length and large diameter. The frame is of a high grade cast steel and the workmanship of a superior grade. The machines have a



THE BOGUE DYNAMO.

good reputation. The machine shown in cut has a capacity of 1,050 amperes at 6 to 7 volts and is direct connected to a ten horse power 230 volt motor.

Another type of dynamo, the so-called "Leader" machines, is made by the Don Chemical Mfg. Co., of Mansfield, O. These dynamos are so compounded as to give a uniform voltage at the terminals, regardless of any changes of load without the necessity of shifting the brushes to meet the changing conditions of the load.

THE DOW DYNAMO.

Therefore no provision is made for the ready shifting of the brushes, the rocker arm being provided with set screws which hold them securely in the one point of commutation. The bearings, which are long and of ample bearing surface, are of the ring oiler type, large oil reservoirs being provided.

The armatures are of the toothed core construction and ventilation of core is provided by centre punchings, which form internal openings which intersect with air ducts between the laminations.

The commutator segments are of hard drawn Lake Superior copper assembled with pure mica segments and mounted in flange rings of substantial construction.

The yoke is of the circular pattern and insures the shortest possible magnetic circuit. It is made of soft gray iron of high permeability. Pole shoes of cast iron are provided which act as coil supporters.

The brushes are liberally proportioned, allowing ample brush surface. They are of leaf copper with laminations of a proper metal of high resistance, so tempered as to take the wear instead of cutting away or flaking the commutator. The armature winding is of the barrel type, made of form wound coils, the coils being mounted in such a way as to insure ready accessibility and ease of repairs. They are made of rolled copper wire, doubly insulated and taped, the slots being insulated also with fibre linings. The brush is clamped firmly with solid contacts, and the body of the holder is of heavy brass, insuring ample metal area to transmit the current without heating. The brush stems are of heavy brass rod, so constructed as to support the brushes and holders on a substantial rocker arm, and allow ready adjustment or removal for repairs. Each machine is provided with a field regulating rheostat, by which the proper adjustment of the voltage may be made. These machines are wound for from 5 to 6 volts, but with the use of these rheostats the voltage may be controlled over a still broader range.

PRODUCTION OF A MIRROR SURFACE ON FLAT METAL SURFACES.

By Charles H. Proctor.

The production of a high lustre on a metallic surface, on flat brass or any other metal, is usually due to skill in manipulation. The method used in the United States for these metals after they are roughed out in the usual manner with emery wheels, using No. 60 and No. 100 emery, is as follows: For cutting down a buff wheel is made up from discs of unbleached cotton, sheeting cloth and brown wrapping paper. These discs should be 12 inches in diameter and one section of paper should be used to two sections of cloth. A sufficient number of these discs is used to make up a wheel with a face of three or four inches. The wheel should be run at a speed of 2,000 or more R. P. M. and a Tripoli composition should be used.

For coloring there are used discs of cotton sheeting cloth six to nine inches in diameter with a small disc of brown paper two to three inches in diameter between each two sections of cloth. This is done to keep the wheel from clogging. A sufficient number of discs should be used to make a wheel with a 2 to 3 inch face. Its speed should be about 2,000 R. P. M. A good rough composition should be used with a little paraffine or lard oil, which keeps the wheel clean. The wheel should be combed out frequently with a curry comb so as to keep it from scratching.

Canton flannel, which is cotton cloth with a woolly surface on one or both sides, should be used for finishing. This wheel should be made up of discs 12 inches in diameter and should have a face surface of at least 3 inches. It should be run at a speed of 800 or 1,000 R. P. M. A finely pulverized rouge mixed with wood alcohol should be used and a little of this should be applied to the wheel with a flat brush. The wheel should be kept clean by frequently combing it out with a curry comb and it should be used only for finishing the surfaces. This operation will produce a very high lustre without scratches or waves if the previous operations have been carried out in the proper manner.

THE FOUCHE OXY-ACETYLENE BLOWPIPE.

By J. Horton.

The latest introduction into Birmingham (England) metal works is the Fouché Oxy-Acetylene Blowpipe. For some time past, chemists have been aware that the combination of oxygen and acetylene would yield very great heat, but the application of this heat by means of the blowpipe is a quite recent introduction. The new process is really a further step from the Oxy-Hydrogen system of autogenous welding which has long been in favor with engineers, and has in many instances superseded electric welding. The Oxy-Acetylene system promises to be of much wider usefulness, being applicable to a great variety of metallurgical operations. On the continent of Europe the Fouché blowpipe has been rapidly taken up.

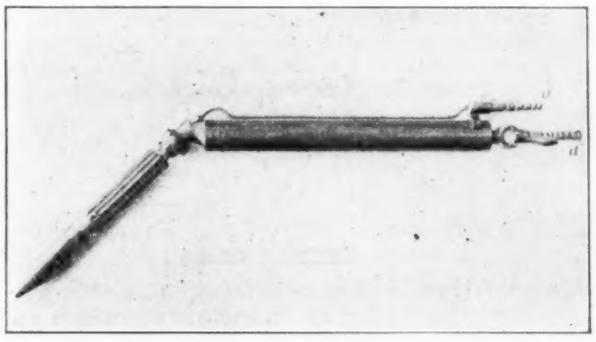
Acetylene is an endothermic gas which is decomposed into carbon and hydrogen, yielding a temperature of 300 B. T. U. The great heat produced by the addition of oxygen is furnished by the combustion of the carbon and hydrogen. The total heat generated per cubic foot of acetylene is about 1,500 B. T. U. Experiments have shown that 2½ volumes of oxygen are required for the complete combustion of one volume of acetylene, but with the blowpipe the best welding results are obtained with 1.7 volumes of oxygen to one volume of acetylene. The combined flame has in its center a small white cone, at the apex of which the temperature is about 6,300 degrees Fahrenheit.

The protection of the metals from injury at this great temperature is due to the fact that around the flame is a relatively cool covering of hydrogen, which being unable to combine with oxygen at so high a temperature in the immediate neighborhood of the flame continues temporarily in the free state, protecting the inner zone from loss of heat, and excluding the possibility of oxidation. Another advantage of the flame is that from the blowpipe it is more concentrated, and remains as a short steady jet, thus facilitating manipulation.

The acetylene is furnished from any ordinary generator and only the oxygen is required to be under pressure. The blowpipe is built on the injector system, commonly used for lead-burning, but the flame cannot strike back. The gases are thoroughly well mixed in the injector chamber and the nozzle is constructed so as to prevent any carbonaceous deposit in the orifice. Better results are obtained if in conjunction with a blowpipe an oxygen pressure regulator is employed, which can be obtained at a very reasonable figure.

The oxy-acetylene blowpipe can be used for brazing in connection with bicycle frames, forks, tee standards, wheel rims, motor-car frames, jointing and welding of pipes, metallic casks, petroleum barrels, enamel ware, and nearly every form of artistic metal work. For copper, its value will be considerable, because it is well known that many accidents have occurred through the deterioration of brazed copper joints under galvanic action. The fused joint will not be subject to this liability.

A demonstration was recently made at Birmingham, by Mr. A. E. Knowles, the manager of the Birmingham Oxygen Co. The demonstration was applied mainly to iron, steel and copper, the assumption being that if the blowpipe can deal with these most refractory metals, its application to more readily pliable and fusible metals may be taken for granted. Mr. Knowles exhibited a copper tee about 8 inches in length and constructed of 1½ inch tube. The tee part had been let into the tube, and the welding was so perfect and complete that the fitting had stood a test of 500 pounds to the inch. The iron and steel experiments were of a very striking character, indicating an entirely new field of usefulness. Several cracked tubes, including gas and steam bends, had been sent by large manufacturers for repair. The metal had given way in the bending, opening a gap from 2 in. to 2½ in. in length by ¼ in. in diameter. This was filled up by the operator with the greatest ease. The tubes were first heated to cherry redness in a blacksmith's hearth, as a precaution against cracking from sudden contraction, and then placed in a vice exposing the fractured portion. The workman, wearing a pair of dark spectacles to protect his eyes from the glare, applied the flame to the fracture, over which at the same time he held a piece of soft iron wire. The wire was melted and ran into the "wound" of the bend in a perfectly molten condition. In less than three minutes the opening had been perfectly filled, and a subsequent test of 1,000 pounds to the inch made absolutely no impression whatever on the bend. The discovery will mean to tube makers the saving of hundreds of pounds' worth of defective products which for many years past have found their way to the scrap-heap as their only destination. Another experiment was the fusion of a pipe inside a flange which was done in the most perfect manner. For carrying out such a weld as this, the entire cost in gases would be less than



THE BLOWPIPE.

one halfpenny. The oxygen is supplied at 1½d. per cubic foot, while acetylene generated on the consumers' works, will cost approximately 35 shillings per thousand cubic feet. Yet with all this cheapness the blowpipe will be able to save from the scrap-heap articles costing in some cases as much as £300.

Another interesting operation was carried on by a boy, and consisted of the welding of a copper tube. By merely passing the blowpipe along the butt edges of the tube a perfect weld was made.

It is quite certain that within a few months the blowpipe will be in use in a great number of the numerous metal trades in Birmingham. One disadvantage must be mentioned—so far, it has been found impossible to utilize it with such alloys as brass, apparently for the reason that the flame deals with the two constituents separately, the result of which is that the zinc is destroyed before the copper is melted. Unless some method of dealing with this is discovered, it is obvious that to this extent its usefulness will be restricted. In many cases of welding it will not be necessary to obtain so high a temperature as 7,000 degrees, and very good results even with the more obstinate metals, can be obtained with 5,700. When the maximum heat is approached there is danger of burning from excessive oxygen, but the combination lends itself very readily to regulation owing to the peculiar appearance of the flame cone.

The practised workman can tell instantly when he has secured the right proportion. The condition is deter-

mined by the projection of the second cone of flame from the brilliant spot produced at the mouth of the blowpipe. The firm are receiving orders from metallurgists in all directions, anxious to apply the apparatus to a great variety of uses.

MANGANESE BRONZE PISTON.

The recent breaking down of a 500 H. P. engine at the works of the Standard Roller Bearing Company in Philadelphia was the immediate cause of the company utilizing manganese bronze for an engine piston. On Friday night one of the connecting pins of the engine parted, which resulted in the smashing of the cast iron piston and several other parts of the engine, leaving it a wreck for the time being. A problem then confronted the works of casting a new piston with no power to drive the blower for the cupola, therefore no means of melting cast iron. To have ordered it from an outside works with the present crush of orders prevailing everywhere would have meant considerable delay. As there was a brass foundry connected with the plant using natural draft, it was determined to make the new piston out of manganese bronze. The company, therefore, sent for some Parson's ingot and in the course of a day had cast a 20-inch diameter piston weighing 450 pounds. It was machined as quickly as possible, the other parts of the engine were repaired and by Monday morning the motive power was running the same as usual. The piston has been in constant service since and is giving excellent satisfaction and the management are having such success with manganese bronze for various parts of their engineering apparatus that they have decided to use it for the front axles of their automobile trucks.

MELTING ALUMINUM, SMALL LOTS.

Aluminum can be most satisfactorily melted in small lots by employing a plumbago crucible in connection with a coke hole. This coke hole is constructed after the ordinary manner, having its top on a level with the floor, and being a fire brick lined cavity in the ground to which there is a reasonable amount of draft.

A fairly satisfactory method of constructing such a coke hole would be to arrange a grate underneath which would accelerate the draft, and encircle the entire coke hole with a piece of boiler iron at the top of which an aperture could be cut which would lead to the stack. This should be so arranged that the ashes could be readily cleaned out underneath the coke hole from time to time.

There is no particular knack in the method of handling aluminum. It does not require, of course, the degree of heat that the ordinary foundry metal does, and care should be exercised to avoid burning it or overheating it. Complete descriptions how to melt and alloy aluminum have been published in THE METAL INDUSTRY a number of times.

STRONGEST ALUMINUM BRONZE.

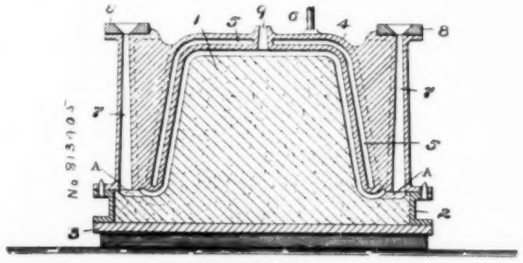
The experience of practical metallurgists is that the strongest and hardest aluminum bronze is the following mixture:

Copper	89.0%
Aluminum	10.5%
Silicon	.5%

Silicon is added as a hardener and is put in the form of silicon-copper. This alloy is not ductile or workable as some of the other aluminum bronzes, but is the strongest as well as the hardest.

MOLDS FOR CASTING HOLLOW WARE.

In the accompanying illustration there is shown a construction of a mold which is claimed to be especially intended for cases where a number of vessels are required of the same material. The mold is constructed of a green sand core, 1, formed within a drag flask, 2, by the aid of a core box and sitting on a bottom board, 3. The cope, 4, for the exterior forming portion is composed entirely of metal, and all the way about its interior there is formed a chamber, 5, which, by means of a pipe, 6, communicates with the steam supply. In this way it can be heated to about 260 degrees F. The cope is also provided with pouring gates, 7, and gate boxes, 8, as well as a vent opening, 9.



THE MOLD.

Before the mold is closed, the active surface of the core is sprayed with a molasses and water solution and the interior of the cope receives a wash of lime. The cope is then lowered onto the drag portion and clamped. The heat from the cope is sufficient to bake the molasses-sprayed surface of the sand core and form a skin-dried core. With this form of mold the metal must enter at the lowest point and therefore the pouring gates communicate with the flange or rim-forming portion by means of runners, A. The gases produced by the rising of the metal in the mold during pouring escape at the vent opening.

When the casting has been made the gate boxes are struck with a hammer so that the sprue collected in them is broken away from the gates. It is stated that the castings produced are clean and smooth and do not require sand blasting or acid pickling. The mold has been patented on February 27th, 1906, with U. S. patent 813,405 by F. D. Cook and George A. Conrath, of Blairsville, Pa.

METHOD OF CASTING COPPER.

According to a foreign exchange a new process devised by A. Collett which has been in use for the past eighteen months at the works of the Nickel Bronze Company, Birmingham, produces sand copper castings of high conductivity. It is stated that it depends not upon alloying the copper with any other metal whatever, but wholly upon the use of a particular flux. It is stated that a guarantee is given that the impurities will not exceed ½ per cent, and that the castings should be so ductile that they can be hammered out cold practically to a knife edge without splitting, doubled up and hammered flat without showing signs of fracture, and forged hot without flying. The castings are guaranteed to be sound and free from blow holes.

The varnish for patterns should be selected carefully so that it will dry quickly and give a smooth hard surface.

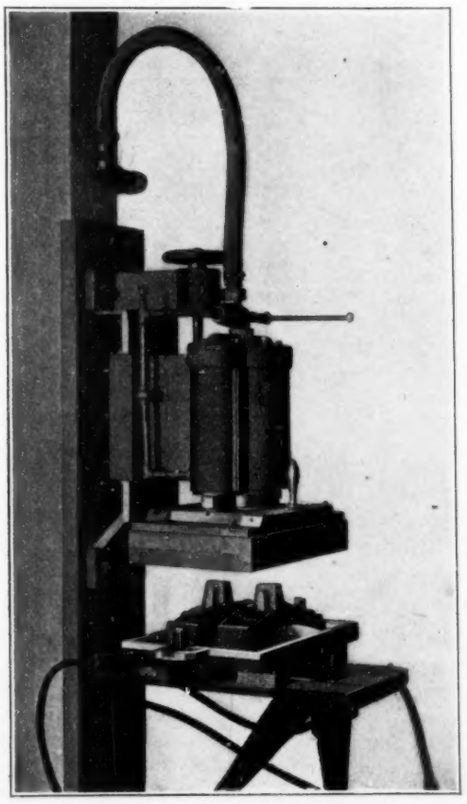
It is stated that the nickel mining industry in Canada produces more of this metal than all the rest of the world.

INDUSTRIAL

NEW AND USEFUL MACHINERY, DEVICES, APPLANCES A ND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

BENCH RAM MOLDING MACHINE.

The J. W. Paxson Company, of Philadelphia, Pa., manufacturers of foundry supplies, have decided to push their molding machines, of which they manufacture a complete line, and are at the present time engaged in erecting a new machine shop which will be used for the building of these machines. One of the latest types designed by this firm is the Pneumatic Bench Ram Molding Machine, shown in cut. It consists of a triple ramming cylinder (one large one in the center, two small ones on each side), operated by a valve which controls the air in such a way that a squeeze or a heavy stroke may be imparted at the will of the operator. A portion of the exhaust escapes through the



THE MACHINE.

small cylinders, which returns the hard-wood ramming head and holds it in position ready for use. The cylinder is held in position by the U-shaped guide plate and the cast iron arm, which are in one piece. The cylinder can be adjusted to the different depths of flasks by releasing the six set-screws which hold it into the guide plate and the pilot wheel raises or lowers it. The machine is built for snap work and an extra heavy 35-inch long table is furnished to draw the mold from under the rammer and turn over. It also has a knee pad which operates the vibrator valve, leaving the molder's hands free to take off the cope and frame. The entire machine is securely bolted to an oak plank, 2 x 12 x 6 inches. By removing the flask table, small hand-ram molding machines can be operated.

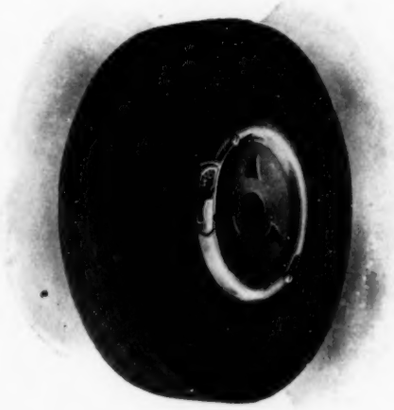
The company also manufacture vibrators, a cut of which is shown with the vibrator regulator attached.

THE VIBRATOR.

The vibration of the pattern plate and pattern is considered essential to the rapid drawing of the pattern and the regulator allows the passage of the correct amount of air necessary for vibrator operation. When new vibrators are bought no extra charge is made for the regulator. Further particulars may be had from the manufacturers.

THE BACKUS WHEEL BALANCE.

The patented device shown in the accompanying illustration is designed to provide a means for balancing felt, leather, fibre, canvas, cloth or leather-covered wood polishing wheels, without injury to the wheel. It is made in the form of a washer or collar to go on the sides of the wheel, having pins to secure it in place and having annu-



THE WHEEL.

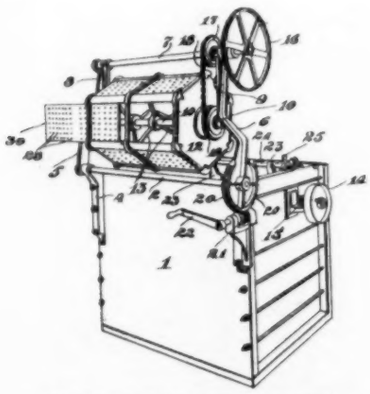
lar recesses in the outer edge which can be opened and closed at will. These annular recesses or pockets are to contain lead shot, in quantity suitable to perfect the balance of the wheel.

There are few polishing wheels made that are accurately balanced. It is almost impossible to so distribute the density of the wheels that, when revolving at a high rate of speed, all parts will be of equal weight. To correct this natural fault it is the custom in most polishing rooms to nail on with wire nails a small or large piece or pieces of lead, near the point judged to be the lightest part. The wheel is then turned down until it runs true.

This process rapidly wears out the wheel, causing waste of material and also spoils the wheel at the point penetrated by the nails. The pieces of lead, being simply nailed or screwed on to the face of the wheel, protrude beyond the sides of the wheel in such a manner that in revolving they come in contact with the work, often spoiling it and also often injuring the hands of the workman. It also frequently happens that these pieces of lead, being insecurely fastened, fly off and injure the operator or any one passing in the vicinity, thus giving grounds for a suit for damages.

These faults are corrected by the wheel balance. The spindle of the polishing lathe passes through the balance as well as the wheel, thus securing it in place, making it impossible to have it fly off and cause injury. It has a smooth and uniform surface which will not cause injury to anything when brought in contact with it while revolving; and it is so easy and simple to operate that there is no excuse for running a wheel "out of balance," thus insuring a large saving in time and material. The flange, or balance, remains on the wheel until the wheel is worn out. A few seconds only are required to correct the balance of weight. Finally, when the wheel is worn out, the balance can be removed and placed on another wheel. The device is manufactured by the Zucker and Levett and Loeb Company, New York.

The polishing wheel above described was patented by C. G. Backus, of New York, and assigned to the Zucker & Levett & Loeb Company with U. S. patent 817,462 of April 10, 1906.



PLATING TANK WITH DRUM.

Another patent, No. 817,832 of April 17, 1906, which was also assigned to the Zucker & Levett & Loeb Company by the inventors, C. G. Backus and G. L. Wallace, refers to a new construction of a plating apparatus. It is shown in perspective view in the accompanying figure, the drum being shown raised and in a position to be charged with work to be plated. The solution tank 1 is preferably formed of wooden boards, and the shaft 10 of the drum is so mounted that it can be easily raised by means of turning an endless screw 21, which is operated by the crank 22. The drum is thus raised so that it can be easily charged and emptied. Whenever the operator raises the drum to a desired position, it will be maintained in that position independently of any other locking devices, which is quite an advantage where the drum has to be frequently raised and lowered. Electrodes 23 are located on each side of the drum and suspended from conductor bars 24. The electrodes are curved so as to conform to the surface of the plating drum. A small gap is left between their ends so that any sediment can fall through.

The drum is polygonal in cross section and the boards are formed of two thin sections, each provided with a number of small holes which are staggered in respect to each other. This construction makes it impossible for an article which is being plated to become fastened in the opening, as frequently happens in the ordinary construction of drums. The inner section is preferably formed of wood and the outer of hard rubber. Owing to the angular form of the drum and its relation to the surface of the liquid, the revolutions of the drum will cause the angles to project above the liquid at their highest points. This construction causes the electro-plating solution to flow in and out of the drum and thus produces a constant circulation of the liquid through the drum and over the articles being plated. It is stated that this feature is of special advantage, inasmuch as the metallic contents of the solution in the vicinity of the articles being plated are quickly exhausted, which fact retards the deposition unless fresh solution is introduced around the articles.

A COMPRESSED AIR BLOWER.

Many factories are now being equipped with compressed air and as a new article in this field there has been brought out for the use of the foundryman the Powell Blow Gun, which finds ready use as a substitute for the common bellows for blowing out sand molds, flasks, core boxes, and for general foundry dusting. This appliance may also be used for blowing out metal chips and other refuse in bench tools, taps, dies, and the like, as well as for the general cleaning of lathes and work benches.

THE BLOW GUN.

The inlet end of the valve body is attached to the hose leading from the air compressor system and the Blow Gun grasped in the palm of the hand; pressure by the thumb upon the knob shown in the cut will give a blast varying in intensity with the degree that the knob is depressed. These blowers are being marketed in the vicinity of New York by Franklin Williams, 39 Cortlandt street, New York, who will furnish further particulars, prices, and any other data that may be desired.

A metallurgical feat of the Lake Superior Copper Mill, of Pittsburgh, Pa., is to cast a copper cake 30x38 inches, 16 inches deep, holding 5,760 pounds of copper. This cake is rolled into a plate 72x240 inches, ¾ of an inch thick. The plate is used for the manufacture of glucose kettles.

The consumption of lead of the United States amounted to 311,200 tons in 1904, as compared with 273,648 tons in 1903.

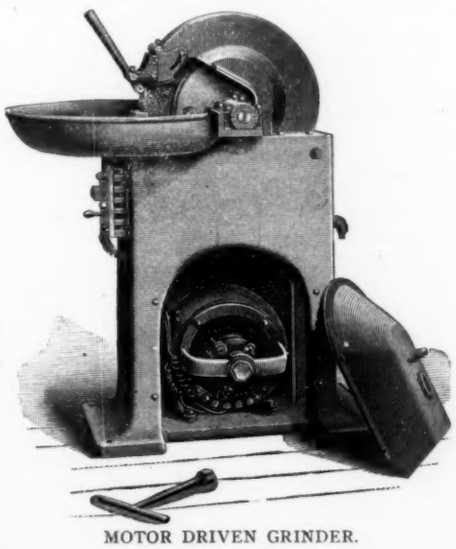
METHOD OF MAKING PATTERNS FOR METAL CASTINGS.

A method which has recently been patented with U. S. patent 814,209 of March 6th, 1906, by A. N. Holstein, of Syracuse, N. Y., aims at producing patterns for metal castings and especially casket ornaments by a less expensive procedure than has been heretofore. The casket ornaments are usually made in heavy relief from plastic material which is pressed into a metal female mold. This procedure involves the carving of the pattern out of a solid block of metal. The new invention aims at obtaining a negative pattern of plastic material in a casing of wood, which is to be used for casting a negative metal mold for the subsequent formation of the plastic ornaments.

The method involves the following operation: First, the production of the positive ornament which is carved in wood; second, the rough chambering of a block of wood or equivalent material to a sufficient amount to receive the entire positive ornament; third, the introduction of heated plastic material into the recessed chamber of the block; fourth, the rendering of the surface of the positive ornament non-adhesive by treating it with a liquid such as oil; and fifth, the pressing or forcing of the positive ornament into the plastic body until the entire ornamental surface is thoroughly impressed. After this the positive ornament is withdrawn, leaving a negative impression in the plastic body. The wood casing which encloses the negative plastic mold is then sawed or blocked out so as to bring it into the desired external form for casting. Thus a negative pattern of the positive ornament is produced in a casing of wood, which may be used to make as many reproductions of the metal as may be desired for ornaments such as those for caskets.

MOTOR DRIVEN GRINDER.

The accompanying cut shows a style of motor driven water tool grinder with the motor placed in the base of the machine. This, as stated by the manufacturers, The Ransom Manufacturing Co., Oshkosh, Wis., insures stability and thorough protection from water and dust and takes up no extra room. In the machine

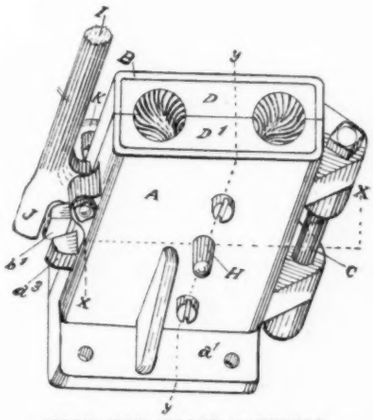


MOTOR DRIVEN GRINDER.

shown in cut it is claimed that there is perfect control over the water and that there are no pumps or syphons to get out of order and that the journals are dust proof and ring-oiling. With the motor drive there are no loose pulleys or countershafts to wear out and no loose pulley running all day for the sake of grinding one or two hours. The cut shows the brush end of the motor with the hood removed.

METAL MOLD FOR MAKING BRASS CASTINGS.

In the August, 1905, issue of THE METAL INDUSTRY a description was given of a mold constructed by Mr. F. Haggenjos, of St. Louis, Mo., for casting brass castings and specially railroad car and engine journal bearings. The mold has recently been improved and the latest form has been patented by U. S. patent 816,315 of March 27, 1906. The mold is shown in the accompanying illustration.



MOLD FOR BRASS CASTINGS.

The new features added are the chambering out of the tops of the two mold-sections and the insertion of loose plugs or cores DD', made of iron, hard sand, or composition. These plugs are provided with two gate-openings into the internal cavity of the mold and form the upper end surface of the mold cavity. They may either be made in two parts or solid in one piece, and the molten metal may be poured either in one or both of the gate openings. This allows an easy escape for the gas from the mold cavity and provides ample gate and sinker capacity to hold up the shrinkage of the casting. At the same time it saves the melting of more than two-thirds of the gate metal at each casting and goes far toward the production of a more perfect casting.

On the inside of the mold, on the drag side of it, the convexed portion which forms the concave bearing side of the casting is made loose and secured to the body part of the mold A by screws. When the piece is removed a three part extension piece is also secured in its place by screws. This piece extends farther into the cavity of the mold and forms the chambers for the babbitt metal in that form of bearing called "shell" bearing. This construction makes it possible to make both solid and shell bearings in the same mold.

A compound lever I is pivoted on the outside of the mold to the drag section A. The lower end of this lever is constructed with an arm J, which is forced by the motion of the lever between two lugs and opens the mold. The side of the lever is provided with a hook-arm K, which by the motion of the lever passes over the cope side B of the mold and locks the two sections together. The locking and opening of the mold is therefore performed by the same lever, which saves time in the manipulation of the mold.

In 1904, for the fifth time, the total value of the mineral product of the United States, according to the official statistics, exceeded the sum of $1,000,000,000. The value of the iron output was $233,000,000, and that of the coal $445,000,000.

CORRESPONDENCE

IN THIS DEPARTMENT WE WILL ANSWER ANY QUESTION RELATING TO THE NON-FERROUS METALS AND ALLOYS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

METALLURGICAL.

Q.—Will you kindly furnish me with a formula for manganese bronze?

A.—The following is a formula which may be used for sand castings:

Copper	55 per cent.
Zinc	42.38 per cent.
Iron	1.25 per cent.
Tin	.75 per cent.
Aluminum	.50 per cent.
Manganese	.12 per cent.
	100.00

PLATING AND FINISHING.

Q.—Kindly inform us what you consider the best wearing lacquer and furnish us some directions for putting it on for lacquering on brass. We have tried several lacquers and after a little usage with the hands we find that the lacquer wears off very quickly.

A.—The collodion lacquers produce the hardest finish of any of the metal lacquers. They consist of 6 oz. gun cotton, dissolved in one gallon of amyl acetate. The thinner, of which very little is used, should consist of equal parts of benzol and fusel oil. The application should be made by dipping the articles for a moment and then removing them and hanging them on suitable frames to drip. They are then dried in the usual manner. At least two coats should be given to avoid iridescent colors and to produce a sufficient wearing body. Another good lacquer that will produce good results consists of equal parts of French wood alcohol varnish and the amyl acetate collodion mentioned above. As a thinner there are used equal parts of amyl acetate and fusel oil. For use take one part of the varnish and collodion and one part of the amyl acetate and fusel oil. A sufficient body can be given with this lacquer in one operation, using the same method as mentioned above.

Q.—Please let me know a good paint for rose and green that will stand a hot solution.

A.—For a stopping-off varnish common air drying japan thinned down with benzol will give good results. This will dry hard if it is put in a warm place for a short time. The varnish may easily be removed after the operation with benzine.

Q.—Please advise us of a formula for royal blue oxidation on brass which we wish to relieve and want the brass to show through. The color required is about the same as the print on your cover.

A.—A blue oxidation for relief purposes may be produced by polishing and cleaning the brass articles in the regular manner and then immersing them in a nearly boiling solution made up as follows:

Water	1 gal.
Hyposulphite of soda	2 oz.
Sugar of lead	2 oz.

The solution produces a blue color in a few seconds. The tone may be regulated according to the length of time of the immersion.

Q.—Kindly furnish me a formula for a good brass and copper solution.

A.—A copper solution which will give excellent results may be made up from the following ingredients:

Water	10 gals.
Bisulphite of soda	1¾ lbs.
Carbonate of soda	2 lbs.
Carbonate of copper	1¾ lbs.
Cyanide of potassium	2¼ lbs.

The cyanide is dissolved in half the quantity of cold water and the soda salts in the other half, adding the copper solution to the soda salt solution. The two solutions are then mixed together and boiled for half an hour. The resulting solution may be used either hot or cold.

For a good brass solution the above formula may be used. A good deposit of copper is obtained first and one part of carbonate of zinc is dissolved in two parts of potassium by weight, using as little water as possible for solution. This is added by degrees until a good brass color is produced. An amount of ¾ oz. of zinc per gallon should be sufficient. If the brass solution works smoky, two or three grains of arsenic dissolved in twice the weight of caustic soda may be used to each gallon. A little ammonia will accomplish the same results as the arsenic.

Q.—I have a brass bath which contains too much arsenic, and plates gray. Kindly advise how I can remove the arsenic.

A.—There is no method by which the arsenic can be removed from a bath except by working it out. This may be done in a short time by hanging sheets of iron on the work pole and using a strong current, or by reducing the solution and again adding copper and ammonia to build it up, and adding the solution removed occasionally. Good results may be obtained also by the occasional addition of a little bisulphite of soda and ammonia without arsenic.

Q.—Kindly inform me how to make nitrate of silver.

A.—In order to prepare nitrate of silver take equal quantities of strong nitric acid and water and heat gently upon a sand bath or on a hot water bath. Cut up the silver in small pieces and add all of that to the acid solution that it will take up. Two oz. of the mixture will dissolve one oz. of the silver. In order to produce the crystals, evaporate the solution thus formed until crystallization is complete.

Q.—Please inform me how to bring chloride of silver back to the state of the metal.

A.—Finely divided metallic silver may be obtained from chloride of silver by diluting hydrochloric acid with an equal amount of water and placing the chloride of silver in the solution. Strips of zinc are then added until the prescription of the metallic silver is complete. The chloride of zinc which is formed in this operation is then filtered off and the precipitate of silver is washed and dried. Another method consists in mixing the chloride of silver with four times its weight of carbonate of soda and half its weight of pulverized charcoal. The whole is brought into the condition of a paste and is then dried and reduced by heat in a crucible. The silver will be found in the shape of a button. If granulated silver is desired the molten metal is poured into water, the crucible being held several feet above the water and poured in a thin stream.

Q.—Kindly furnish me with a gun metal finish upon iron which produces a good black.

A.—For producing a gun metal finish upon iron the articles should be copper plated in the usual manner and scratch brushed. They are then passed through a mercury dip which consists of the following ingredients:

Water	1 gallon.
Cyanide of potassium	2 oz.
Yellow oxide of mercury	⅛ oz.

The articles are afterwards washed and placed in a silver solution for two or three minutes in order to give them a flash. They are then washed again, flashed in a copper solution and are then immersed in a cold solution which consists of two oz. potassium sulphide and two oz. of ammonia water to each gallon of water used. This method of operation will produce a somewhat smoky black. However, if the articles are scratch brushed with a fine brass brush using a little sal soda in the brush water, a beautiful gun metal finish can be produced. For the method to be used in obtaining an electro deposit refer to the Correspondence Department of the January, 1906, issue of THE METAL INDUSTRY. The articles should be plated in copper or brass, scratch brushed and flashed in a nickel solution.

Q.—Kindly inform me of a good way to obtain Pompeian bronze finish in the plating tank without painting it.

A.—You cannot produce Pompeian bronze in a plating solution. See article on Verde Antique in the March issue of THE METAL INDUSTRY and the article on the New Era Verde Antique Finishes in the April number.

Q.—Please let me know what makes cyanide of copper solution turn green.

A.—There is only one reason for the cyanide of copper turning green and that is because it is slightly deficient in free cyanide. If you add a small amount of cyanide the solution will be brought back to its natural color.

Q.—Kindly inform me of a good way to brush brass work without staining it after it is lacquered. Let me know if dampness is the cause of its staining.

A.—We do not exactly understand the question. If you produce your brush brass by the wet method, an immersion in a cream of tartar solution containing 2 or 3 oz. to the gallon and passing through boiling water without cold washing will prevent the staining that may be noticed under the lacquer.

Q.—I am in need of a process to produce a gun metal dull finish right directly on iron, such as cigarette cases of sheet iron or steel without copper or silver plating. Please advise me how I can produce such a finish.

A.—You have probably in mind the Bower-Barff finish which is the only successful method of producing the dead black gun metal finish without plating or producing an imitation of this finish with a dead black lacquer and sand blasting. For the production of the Bower-Barff finish see the article by Mr. H. J. Hawkins in the September, 1905, issue of THE METAL INDUSTRY. A solution made up in the following manner is claimed to produce a black finish directly upon iron and steel and when lacquered and lightly sandblasted will give the desired results. The solution consists of:

Water	1 gal.
Nitrate of lead	12 oz.
Nitrate of Ammonia	8 oz.

Sheet lead is used for the cathode. In this process the current must be reversed and the articles must be made the anode. A temperature of 120 to 150 degrees should be used. In all cases the slinging wires should be of soft iron or steel to prevent contamination of the bath.

Q.—Could you kindly give me a recipe for a finish called "crystallized brass"? This may not be the right name, but is what I am told. I have seen some samples and the name suits it.

A.—Crystallized brass may be produced by immersing the articles in a solution composed as follows:

Sulphate of copper	8 oz
Chloride of Ammonium	4 oz.
Water	1 gal.

The solution should be used slightly warm. The articles should be cleaned in the regular manner and immersed in the solution until the crystallized effect develops. This may take place in a few seconds. The articles should be washed, dried and lacquered in the regular manner.

Q.—We would like to know how to finish copper in the following shades: Green, blue, brown and wine color. Please advise us how we can do it.

A.—A variety of colors may be produced upon articles of polished copper by using a nearly boiling solution of the following composition:

Hyposulphite of soda	4 oz.
Sugar of lead	2 oz.
Water	1 gal.

A variety of colors are produced upon cheap articles by using aniline colors soluble in alcohol. A concentrated solution is made up and portions of it are added to the regular lacquers to produce the colors desired. Soft enamels applied with pencil brushes are also used. These colors dry very rapidly with the aid of heat.

Q.—I should like to ask for a formula for etching sterling silver.

A.—Sterling silver may be etched very rapidly by using an electro-etching solution which consists of a 5 or 10 per cent. solution of pure nitric acid in water. The cathode to be used with this solution should consist of pure sheet aluminum and the articles to be etched are connected as the anodes. For etching without the electric current a mixture of equal parts of nitric acid and water is used as the etching fluid. The articles are painted with the usual stop-off varnish and the parts to be etched are then uncovered. By either method nitrate of silver is formed and may be recovered or used in connection with plating solutions if so desired.

Q.—In the issue of THE METAL INDUSTRY for July, 1905, in the article entitled "A New Brass Solution," there is no information as to whether this solution is to be worked hot or cold. Kindly let me know how to use it.

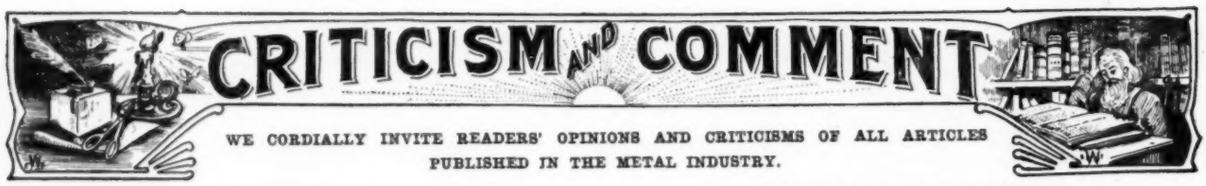
A.—The solution mentioned in the above article should be worked warm, probably at 100 or 110 degrees. Slightly warm brass solutions always produce a richer color than cold ones.

Q.—I wish to do a little plating at home. Kindly inform me if I can get a battery that will give me enough current, and advise me of formula for a gild dip for brass.

A.—A battery which will prove very satisfactory for your purpose is the H. & V. W. No. 1 battery, which can be purchased from the makers, Hanson and Van Winkle, of Newark, N. J., or you may be able to obtain it from local dealers in platers supplies. A useful gold solution consists of

Water	1 gal.
Phosphate of soda	8 oz.
Sulphite of soda	1½ oz.
Cyanide of potassium	6 dwt.
Chloride of gold	3 dwt.

The solution is used nearly boiling. The anodes to plate from should be of 22 or 24 kt. gold.



CHINESE TIN.

To the Editor of THE METAL INDUSTRY:

We notice in your April issue on page 101 "Metal Market Review" that you state as follows: "The most important and interesting feature to all consumers of pig tin in the market to-day is the increasing importation and distribution of Chinese tin. This tin is reported by consumers to be good tin and suitable for nearly all purposes. It is not as good nor as pure as Straits or Malacca tin that runs 99.50 per cent pure, whereas Chinese tin runs 99 per cent pure with about .50 to .75 per cent of lead and other impurities, while the price ranges from ½ to ¾ cent below the cost of Straits."

We write you on this subject since we have imported either directly or indirectly practically all of this grade of tin that has been brought into the United States during the past two years, and have sold much of the 99 per cent tin to dealers and to consumers here. We are selling this tin strictly on analysis, giving the analysis of Messrs. Ledoux & Company, of New York, on each shipment that we make. From the fact that the average analysis of all shipments which we have made thus far shows a percentage of 99 per cent tin or over, and that analyses which we have had made of some grades of Straits tin shows the same percentage of tin, we have every reason to believe that the tin is fully as good as ordinary Straits or Malacca tin. The 96 per cent tin which we also import can be used for many purposes as a substitute for Straits tin.

While it is a fact that only in recent years has this tin appeared in the markets of this country in any quantity, yet considerable shipments have, from time to time, been made for many years past to English and Continental markets, where consuming buyers are apparently more quick to take advantage of the saving effected in the matter of price by the use of this tin.

Judging from the indication which we have of conditions existing in the Far East, we do not believe that Chinese tin will be an important factor in the making of prices in the worlds' market for some years to come.

THE POPE METALS COMPANY, Inc.

SAN FRANCISCO ASKS FOR CATALOGUES.

Tuesday, April 24, 1906.

THE METAL INDUSTRY:
New York.

Gentlemen:

Will you please insert in THE METAL INDUSTRY that C. W. Marwedel, 58-60 First street, San Francisco, Cal., jobber and dealer in machine shop supplies and platers' goods, established at this locality thirty-four years, was burned out in the general conflagration of April 18th. Before the fire was out material was secured for putting up a temporary galvanized iron structure on leased ground in the newer machine shop district until a new steel structure can be erected upon the old site. He expects to be housed and ready for business with a stock on hand inside of thirty days. As office files were nearly all destroyed he issues a general call for catalogues, price sheets and quotations pertaining to machinists' tools, shop supplies and platers' goods. Present address, C. W. Marwedel, 2472 Union street, San Francisco, Cal.

CRITICISM AND COMMENT.

To the Editor of THE METAL INDUSTRY:

The April issue of THE METAL INDUSTRY contains a few articles which request a few remarks from an experienced plater.

1st. The zinc bath as mentioned by Mr. Proctor seems to me to be a very bad bath for articles of iron or steel, for the reason that it is very rich in chlorine salts, which readily attack iron or steel in such a manner as to cause them to rust. I therefore think that a bath of the sulphate or alkaline variety would be much better.

2d. The article on silver paint and the article on lace brings to my mind some experience I once had endeavoring to plate some lace. I followed the advice of others, paid for the chemicals and wasted my time and everything else without success. The method I followed was the same as that mentioned in the March issue of THE METAL INDUSTRY, and was as follows: I treated or at least I steeped a piece of lace in a solution of silver nitrate and then hung it in a chamber filled with hydrogen sulphide gas. Of course the gas blackened the silver and the lace, but it did not make it conductive, as I afterward hung it in a copper sulphate bath and used various currents, but obtained no deposit. I tried other methods with the same results, until now I believe that it is not a good conductor as I have heard several times.

A CONSTANT READER.

To the Editor of THE METAL INDUSTRY:

Your correspondent must go into details a little more in defining his reasons why a deposit of zinc from chloride solution should not be equally as good as one from sulphate solutions. Zinc, unlike copper or nickel, is more electropositive than iron. Deposits of these metals from chloride solutions are not a success. Even from sulphate solutions iron will be found to rust beneath the copper or nickel deposit.

CHARLES H. PROCTOR.

METALLURGICAL CALCULATIONS. By J. W. Richards. 8vo, cloth; 208 pp. New York: McGraw Publishing Co. Price $2.00 net.

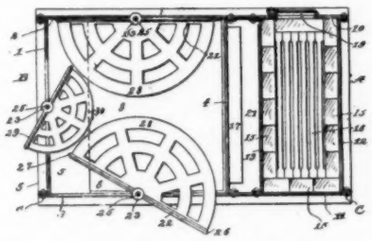
The present volume is Part I of a book which is to appear in three parts and which is based on a series of articles which have been appearing for some time and are still running in *Electrochemical and Metallurgical Industry*. The book deals with the theoretical side of metallurgy and begins with an explanation of the chemical equations and the thermochemical and thermophysical data entering into metallurgical calculations. The matter is explained by the help of numerous examples. The chapters following this portion of the book deal with the calculation of thermic problems, such as the efficiency of producer gas, the conduction and radiation of heat, chimney draft, calorific power of coals, etc. The book is primarily written for students of metallurgy and presupposes an acquaintance with the fundamental facts of chemistry and physics. It is to be welcomed as an addition to the literature of the subject, the need of which was very much in evidence. By thus dealing with a branch of the subject, which usually finds but scant consideration in metallurgical books, the author performed a useful and valuable service.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

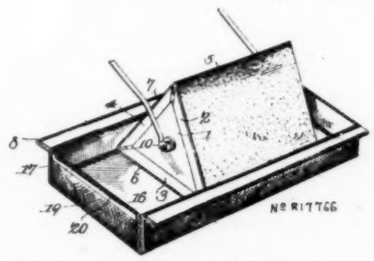
811,107. January 30, 1906. Gripping Means for Wire-Drawing Devices. Hugh L. Thompson, Waterbury, Conn. The invention refers to the arrangement of gripping means for wire drawing drums in order to enable the wire to turn in the gripping jaws as the block rotates from the initial position and to prevent the wire from bending or breaking. The block can be turned in either direction so as to lay the wire upon its periphery. The wire will then travel from the die to the block in a direction tangential to the block. This operation is accomplished in the apparatus without bending the wire.

816,967. April 3, 1906. Core Oven. A. B. Day, Knoxville, Tenn. The oven as shown in horizontal section through the furnace and oven chamber in the accompanying illustration, is composed of a furnace A and oven B. An indirect flue 21 between the wall 13 of the furnace and the oven chamber proper, and which is of considerable length so as to insure complete combustion of the heating gases, leads the latter around the various shelves of the oven and allows of their being heated evenly.



Thus the cores on the lower shelves are subjected to practically the same temperature as those on the upper shelves. The cores are placed upon semicircular rotary racks or shelves 28, 30, which extend into the oven chamber when the doors are closed.

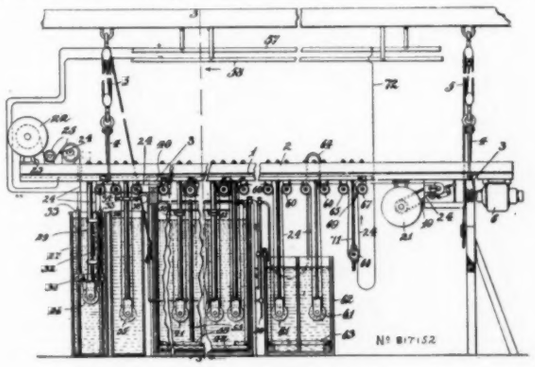
817,766. April 17, 1906. Cleaning and Polishing Device. W. J. M. Hames, Atlanta, Ga. The polishing device is triangular in shape and provided with the respective facings 5, 6 and 7, which latter are made of cloth, felt, wood fiber, leather, sandpaper, etc. It is provided with a handle 8 and yoke 9, and can



be turned around the axis 10. In connection with it there is used a shoe 16, with a detachable facing 17. By the use of the device with the shoe attached the work is first washed or cleansed, the shoe is then removed and the work polished by the employment of one or more faces of the device, each face of which can be provided with a different polishing material.

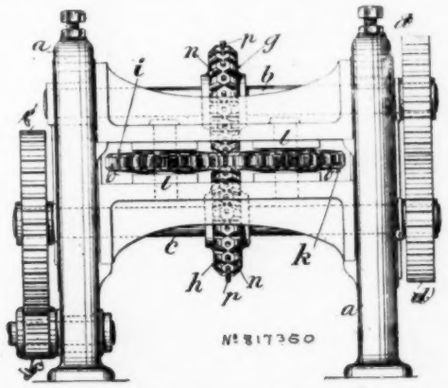
817,796. April 17, 1906. Apparatus for Cross-Rolling Tubular Bodies or Blanks. J. H. Nicholson, Pittsburg, Pa., assignor to National Tube Company of New York. The apparatus is intended to effect an improvement in the Mannesmann process of rolling tubes with conical rolls over a mandrel. The object of the invention is to divide or split up the rolling operation into a number of different steps or sub-operations, all of which are, however, performed simultaneously on the same machine. This is done for the purpose of improving the conditions under which the walls of the tubes are decreased in thickness, so that the length of the tube can be increased and that it can be given any desired diameter independent of the thickness of the wall.

817,152. April 10, 1906. Apparatus for Nickel-plating. J. W. Aylsworth, East Orange, N. J., assignor to Edison Storage Battery Company, East Orange, N. J. The apparatus is specially intended for nickel plating long perforated strips of thin iron or steel, which are subsequently cut up into blanks for pocket sec-



tions of the Edison storage battery. The strip 24 is held tight by suitable tension devices and is first passed into the pickling tank 27, which is provided with anodes 33 of graphite or carbon. A 10 per cent. solution of cyanide of potassium is used for the purpose of generating hydrogen on the face of the strip and thus cleaning it. To prevent its being contaminated by oil, etc., swimming on the surface of the cleaning bath, the strip is passed out through a glass tube 32. It then goes into a wash tank 36, and then into the plating tank 42, which is heated by means of a steam coil 59. The anodes 55 are of nickel and are hung over conductors 56 at the top of the plating tank. From the latter tank the strip passes into the hot water tank 62, which is divided int two sections by a partition.

817,360. April 10, 1906. Machine for Rolling Screw-nut Blanks. T. M. Anderson and R. Wormald, Oldham, England. The machine consists of a frame a with two horizontal shafts b and c suitably geared together, which carry each a roll g and h respectively. These rolls act in conjunction with a pair of rolls



i and k, which are screwed upon vertical shafts. A space is thus left between the rolls into which the bar to be rolled enters. The sides of the upper and lower rolls have recesses, while the side rolls i and k are provided with tooth-like projections, and the four rolls work in strict unison with each other to shape the hot metal bar to the desired outline.

818,147. April 17, 1906. Apparatus for Heating Metals. F. J. Clinch-Jones, Leamington, England. The apparatus is intended to heat metals in a non-oxidizing atmosphere. The articles are charged into a muffle into which gaseous fuel, such as produces gas, is admitted by a circuitous conduit.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

The Pope Metals Company have removed their offices from 3 William street, New York, to 120 Liberty street.

Henry Wray & Son, of Rochester, N. Y., have prepared plans for the enlargement of their present brass foundry and jobbing shop.

The J. L. Roark estate, Greenville, Ky., is in the market for grinding and polishing machinery, and requests dealers to submit catalogues and trade prices.

The Duquesne Reduction Company, of Pittsburgh, Pa., have made improvements in their laboratory so that they can analyze metals more expeditiously.

Lehman Bros., smelters and refiners, of Hoboken, N. J., have put in several additional furnaces for the making of ingot brass. They also run pig lead and spelter.

The Taunton Crucible Company, Taunton, Mass., announce that they have never used American Graphite to cheapen the cost of their crucibles, but use the best grade of Ceylon graphite.

Owing to labor troubles the Haydenville Company, makers of brass and iron goods at Haydenville, Mass., recently shut down their works for an indefinite period, but have again started part of their plant.

John C. Culbert, Pawtucket, R. I., is now buying old trolley wire, copper wire, new sheet brass scrap and punchings, new sheet aluminum scrap and punchings and old aluminum wire, for which he pays spot cash.

The iron frame work is up of the addition to H. M. Shimer & Company's smelting plant located at 19th street and Washington avenue, Philadelphia, Pa. Work on the brick walls will soon begin and pushed to completion.

By referendum vote the headquarters of the Metal Polishers, Buffers, Platers, Brass Molders, Brass and Silver Workers' Union of North America has been removed from New York City to The Neave Building, Cincinnati, O.

The Lunkenheimer Company, Cincinnati, O., manufacturers of brass and iron steam specialties, will shortly erect a new foundry building of concrete, two stories high, covering an acre of ground, at a cost of approximately $300,000.

The Challingsworth Foundry & Machine Company, Mt. Vernon, O., has completed the erection of a new foundry which will now enable the company to make iron castings up to 50,000 pounds and brass and bearing metal castings.

Lawrence Ellerbrock, a coppersmith of Baltimore, Md., has put in a Steele-Harvey Furnace and will make his own brass castings. Mr. Ellerbrock has a large and well equipped shop in the rebuilt burnt district of the great Baltimore fire.

C. J. Donovan, Haverhill, Mass., who was burned out after having been in the brass foundry business for over 20 years, will shortly start a new foundry at 148 Washington street for the manufacture of high speed bearing metals.

There has recently been incorporated at Detroit, Mich., the Eagle Brass Works, with a capital of $100,000. The property of the Eagle Brass Works, now held in partnership, goes into the new organization with a stock value of $72,820.

Bowen & Company, makers of aluminum cooking utensils, London, England, advise us that the Peninsular and Oriental Steamship Company and the New Zealand Steamship Company are fitting out all of their boats with Bowen aluminum ware.

The Turner Machine Company, of Philadelphia, Pa., report that they have received orders from New Zealand for their automatic cock grinders. The company have sold one of these grinders to France, one to Germany, two to England and one to Russia.

The Waterbury Farrel Foundry and Machine Company, of Waterbury, Conn., is again enlarging its works by the addition of a new three story machine shop, 54x66 feet. The history of this company is a series of enlargements since its establishment in 1851.

The J. W. Paxson Company, of Philadelphia, Pa., have started to build their new machine shop, 60 x 90, and located next to their building known as the Annex on Beach street. The new shop will be used for the manufacture of molding machines and foundry equipment.

The Niagara Falls Metal Stamping Works, Niagara Falls, N. Y., are making a business of parts in steel, brass, copper, zinc, tin and aluminum which are stamped in any size and shape required and in any quantity. The company also makes models of patented and unpatented articles.

The annual report of the National Lead Company shows a net earning of $2,082,632, a decrease of $985,000 in accounts and notes payable, and an increase in surplus of $486,939. The United Lead Company, which was purchased January 1, is not directly mentioned in the report.

The Los Angeles Smelting and Refining Company, Los Angeles, Cal., has recently been established by G. A. Cadwallader, formerly with the Cadwallader Tin Plate Metal Company, Pittsburg, Pa., and will manufacture and deal in solder, copper and brass ingots, babbitt, pig tin, pig lead, terne metal, etc.

About June 1 the Speakman Supply and Pipe Company, Wilmington, Del., will move into the old plant of the Wilmington Dental Manufacturing Company, which they have bought and are now fitting up as a brass foundry for the manufacture of brass fittings and plumbers' supplies.

A useful and saving device for platers is sold by the Carboy Inclinator Company, 1328 Columbia avenue, Philadelphia, Pa. The device consists of a curved steel frame, which, when attached to carboys of acids, readily permits the pouring of chemicals without the waste and danger of spilling.

The Globe Brass Company, Detroit, Mich., has begun proceedings toward a voluntary dissolution and possible reorganization with George C. Huebner as receiver. The assets are estimated at $54,096 and the liabilities at $25,022. Inability to earn profits is the reason given by the company for their action.

Josef Radnai, dealer in the rare metals, has moved his office to the Arcade Building, 32 Fulton street, New York, where he has larger and better quarters and can now take large consignments of goods on memorandum, storing them until the seller and buyer agree on a price or the goods are returned.

The Hofeller Smelting and Refining Co., with factory and offices at Ohio and Illinois streets, Buffalo, N. Y., has been incorporated with a capital stock of $20,000, for the purpose of manufacturing all kinds of white metals, such as babbitt, type metals, solder, phosphor tin, pig lead, pig tin, spelter, etc.

The S. Obermayer Company, Cincinnati, O., report that they are receiving daily numerous original and duplicate orders for their "Partamol," which is a perfect separator and prevents the sand striking to the pattern. The use of "Partamol" insures perfect castings at small cost, and the company will send a four-ounce sample package to those desiring to test it.

The Pittsburgh Reduction Company have built a new office at their upper Niagara works. The office is of wood, Colonial style, and is situated right on the bank of the Niagara River surrounded on the other sides by a lawn and concrete walks. If time ever hangs heavily on the office force they can throw fish lines out into the Niagara River as a diversion.

In the April issue of THE METAL INDUSTRY there was a note to the effect that Stanley Doggett, 101 Beekman street, New York, is marketing the "Peerless" parting compound. This should have read "Perfection" as that is the name of the compound sold by Mr. Doggett. "Peerless" is the trade name belonging to the Obermayer Company of Cincinnati, O.

In the Consular and Trade Reports of recent date there is notice of an European government which wishes the names and addresses of American houses or dealers who export scrap metal such as scrap iron, steel, copper, brass, etc. Those interested in this inquiry may obtain further particulars by writing the Bureau of Manufactures, Washington, D. C., mentioning File No. 91.

The Allyne Brass Foundry Company, Detroit, Mich., has outgrown its original plant to such an extent that it has been found necessary to contract for a new foundry building, 50 x 125 feet, which will be equipped with a compressed air system, power plant and new equipment. The company states that this plant will be, with this addition, one of the finest brass jobbing foundries in the Middle West.

The business of the M. S. Benedict Manufacturing Company, East Syracuse, N. Y., has been reorganized and is now incorporated with a capital of $600,000, furnished largely by local capitalists. Operations at the plant were resumed early in April with 200 hands. A New York office and display room has been opened at 409 Broadway and a similar office in the Silversmith building, Chicago.

Wilcox, Crittenden & Company, Middletown, Conn., who have been manufacturers of marine hardware since 1847, have recently incorporated their business with $300,000 capital, of which $250,000 has been paid in. The officers are: President, A. R. Crittenden; vice-president and general manager, W. W. Wilcox; secretary and treasurer, H. C. Whittlesey; assistant secretary and treasurer, H. C. Holmes.

The reports from Providence, R. I., state that at a special meeting of the stockholders of the Gorham Manufacturing Company, held May 1st, it was voted to increase the capital stock of the Silversmiths' Company to $7,000,000. This company is a New York corporation, controlled by the Gorhams, and the purpose of the increase of the stock is for the consolidation of the Whiting Manufacturing Company, the William B. Durgin Company and the Spalding Company, all of which are controlled by the Gorham Manufacturing Company.

The Empire Metal Company, Syracuse, N. Y., one of the pioneers in the manufacture of phosphorized metals in this country, are making a superior quality of phosphor tin, due to their exclusive process of introducing the phosphorus. They guarantee their Imperial grade to carry 5 per cent. phosphorus, which is the maximum amount tin will hold. They are making shipments of ton lots to some of the largest manufacturers of phosphor bronze.

The Monarch Engineering and Manufacturing Company, of Baltimore, Md., report that they now have 200 of their crucible melting furnaces in use in the United States, 12 in Great Britain, one in Germany, one in Japan, and one in Canada, with a number of orders pending. The Monarch people have recently installed additional machinery to take care of their orders, including a five ton shear and punch made by Hilles & Jones, of Wilmington, Del.

Revised price list Number 23 of the Elephant Brand of phosphor bronze has just been issued by the Phosphor Bronze Company, Limited, 2200 Washington Avenue, Philadelphia, Pa. Thereby the company cancels and withdraws all previous quotations and with their increased facilities they are in a position to supply the wants of the trade more promptly. The price list contains valuable commercial information about phosphor bronze in all forms.

The new brass foundry of the General Electric Company at Schenectady, N. Y., is about three-quarters finished. All of the steel framing is in position and the brick walls are partly up. The foundry is planned so that it may be extended at any time, and its present size is about 200 x 75 feet. Four Schwartz furnaces have been ordered, and all of the equipment will be up-to-date, the management saying they will have one of the model brass foundries of the land.

White & Bro., of Philadelphia, Pa., who have been makers of brass ingots for 37 years, have recently built a laboratory, store house and office at their smelting works located at 1505 East Montgomery avenue. They have also added to their metal refinery equipment, having put in a Dings Separator. The firm now sells metal on a guaranteed analysis and according to specification. The firm has been incorporated under the laws of Pennsylvania and supplies some of the largest consumers in Philadelphia.

S. Johancen & Company, of Baltimore, Md., expect to move into their new smelting plant at President and Stiles street June 1. Their new quarters will give them three times the floor space that they have at present, and will enable them to manufacture more successfully solders, babbitt metal, stereotype and linotype metals. They have just bought a hydraulic press from J. Robertson & Company, of Brooklyn, N. Y. Also a white metal rolling mill for making ribbon solder. They report that their business is way ahead of any other year.

The Standard Roller Bearing Company of Philadelphia, Pa., have increased their capital stock to $3,500,000, and have started to build an additional machine shop 150 x 70, four stories, concrete, which material is to be used for all of their future buildings. The company manufacture roller and ball bearings and at present are making 2,000,000 balls per day, and expect to increase their production to 3,000,000 per day. The balls are manufactured in steel, brass, bronze, aluminum, German silver and even in lead and rubber.

The Carborundum Company of Niagara Falls, N. Y., report that carborundum fire sand is being used quite extensively by the zinc smelters for the lining of their retorts. They are selling the sand to the zinc smelters of the United States, Wales and Germany. They are also selling fire sand to the brass industry of England. This sand, which is a bi-product, and of which no use was made of two years ago, is now finding extensive use in the various industries that use furnaces. The copper works are using it in the form of bricks for the arches of their reverberatory furnaces.

E. C. Hazard as trustee of the Genesee Metal Works of Rochester, N. Y., has had plans drawn for the new plant, which will be a brick structure 142 x 210. It will contain a store room, selling room, lead room, zinc room, office and laboratory, and will be located on the main line of the New York Central Railroad, having a spur run right into the works so that cars can be loaded and unloaded from both sides. The company expect to occupy the works next fall, and F. W. Reidenbach, the superintendent, reports that they will have one of the latest and most up-to-date smelting plants in the United States.

Frederic B. Stevens, manufacturer and dealer in foundry, polishing and plating supplies at Detroit, Mich., has recently built a four story brick facing mill 180 x 100 feet. The building comprises six compartments, each separated from the adjoining ones by a 12-inch brick fire wall. The department devoted to sea coal grinding and bolting and that devoted to the grinding of plumbago and fine facings are at opposite ends of the building with the engine and boiler room intervening so that no sea coal dust can penetrate. In the polishing and plating department Mr. Stevens has installed a new filtering plant, which is to be another step toward absolute purity in the finished product.

Among the recent sales of the "Monarch Crusher" manufactured by O. J. Moussette, Driggs avenue and North Tenth street, Brooklyn, N. Y., are the following: One each to: Philadelphia Metal Company, Philadelphia, Pa.; The M. Ellis Company, Meadville, Pa.; Canada Metal Company, Toronto, Canada; Brooklyn Copper Refining Company, Brooklyn, N. Y.; A. A. Levy, Jersey City, N. J.; M. Levy, Ansonia, Conn.; Westinghouse Electric and Manufacturing Company, Pittsburg, Pa., and two to the Syracuse Smelting Works, of Montreal, Canada.

The large brass foundry and smelting works of Clum & Atkinson, of Rochester, N. Y., have put in eight new brass melting furnaces, making 38 in all, and increasing their capacity to 17 tons of metal per day. They have also put in a new crusher, new molding machines, grinding machines and new equipment in all departments. The firm, at considerable expense, has changed its entire system of bookkeeping, having just put in a modern loose leaf cost keeping system which was designed especially for their business and installed by the Baker-Vawter Company, of Chicago, Ill. The foundry of Clum & Atkinson is one of the largest brass foundries between Chicago and New York City.

The Divine Brothers' Company, manufacturers of buffing wheels, have moved their factory into the heart of the city of Utica, N. Y., but at the same time bordering on the New York Central Railroad. They now have a separate office building and a three story brick factory with 11,000 square feet of floor space. The building is of mill construction and equipped with electric power, low pressure steam heat. The company manufacture all kinds of buffing and polishing wheels and a line of water motors which at present are in great demand. They are installing new machinery and make any kind of a polishing wheel up to 36 inches diameter, assembling all the parts in their own factory. Their capital stock has been raised to $50,000, and Smith & Hemmingway have been appointed their New York agents, at 108 Duane street. The company have left their old factory at New Hartford, N. Y.

The Roberts Chemical Company, of Niagara Falls, N. Y., report that 75 per cent. of their caustic potash is now sold in the liquid form. This fluid is put up in drums with faucets attached, enabling the users to readily draw off the liquid into pitchers. It is put up in 650 and 1,300 pound drums and sold for 3¼ cents per pound. Drums of 300 pounds may also be obtained. Trial orders are solicited, and if not satisfactory the potash can be returned with no charge for what quantity is used. Caustic potash is particularly suitable for the use of platers and metal workers. The company having been bothered so much with fires, they have rebuilt their works with fireproof division walls and all wooden construction is ceiled with asbestos plaster board. The plant is also equipped with a quick fire extinguishing apparatus manufactured by the Safety Fire Extinguisher Company of 29 West 42d street, New York. The Roberts Chemical Company now feel that fires or no fires they will be ready to take care of all of their customers and any new ones that come along.

ROLLING MILLS

The Michigan Copper and Brass Company have begun work with a large force of men on the foundations of their new mill, which is to be located at Detroit, Mich.

Barker & Allen, Ltd., Birmingham, England, announce that they have the largest, most complete and up-to-date rolling mills for German silver, sheet and wire. They are buyers of nickel, copper and spelter.

The recently incorporated French Manufacturing Company, Waterbury, Conn., advise us that they now have under way the manufacture, and are ready to ship, small sizes of brass, copper and bronze tubing in round or irregular shapes. F. W. French is president of the company.

The Waterbury Rolling Mills, Inc., which are to establish a plant at Waterbury, Conn., have elected the following officers: Ambrose H. Wells, president; Abel Kenworthy, vice-president; Fred B. Beardsley, secretary; Frank P. Welton, treasurer, and Michael E. Keeley, assistant treasurer. The plant will start to build this spring.

The Driver-Harris Wire Company, of Harrison, N. J., have been working until 9 o'clock each night owing to their crush of orders, and this month will begin to run double time. They have put in 18 new wire drawing machines since January. Their specialty is fine wire, which they draw down to 1-1,000 of an inch. Wire of this fineness is sold for $40 per pound.

The projected new brass and copper rolling mill mentioned in the April number of THE METAL INDUSTRY is to be built by the National Conduit and Cable Company, of New York City. The plans for the mill are as yet in such an unfinished state that no authentic information about the details of the new plant is obtainable, but the fact that the National Conduit and Cable Company, which is a million-dollar concern, is connected with the enterprise, gives strength to the belief that the project will be carried to completion. The Conduit Company at present have executive offices in New York City and operate a plant at Hastings, N. Y., for the manufacture of bare wire and cable and paper insulated cables for telephone, telegraph, electric light and power, also fire and weather proof wire, and install complete underground systems. The corporation have secured the services of C. S. Morse, who was formerly superintendent of the Benedict and Burnham Manufacturing Company, of Waterbury, Conn., and recently superintendent of the Rome Brass and Copper Company, of Rome, N. Y. The development of this latest addition to the family of projected rolling mills will be watched by the trade at large with considerable interest.

TRADE PRINTS

The S. Obermeyer Company of Cincinnati have just issued a second edition of their new brass founders' catalogue.

The Goldschmidt Thermit Company, 43 Exchange place, New York, have for distribution several pamphlets on their Thermit, which would interest ferrous and non-ferrous metal users.

L. H. Gilmer & Company, Philadelphia, Pa., advise us that they are putting in a new stock of polishing machinery and supplies, including only the best, which is fully described in a catalogue lately published.

The Rockwell Engineering Company, 26 Cortlandt street, New York, have issued a pamphlet describing their line of Pot Furnaces for lead and cyanide hardening and for melting soft metals. These furnaces use either oil or gas fuel.

The Hill & Griffith Company, manufacturers of foundry facings, supplies and equipment, Cincinnati, O., are distributing a pamphlet devoted to their "Partine" parting compound. They will send samples of the compound on application.

The Egyptian Lacquer Company, 152 Front street, New York, have just issued a leaflet on "How to Apply and Use Black Lacquers," in which the various processes are taken up step by step. Copies may be had on application to the company.

The April *Graphite*, house organ of the Joseph Dixon Crucible Company, Jersey City, N. J., contains some very interesting information for the user of crucibles, graphite, etc. Some topics are: Crucibles for Brazing, Unions for Steam Pipe Lines, A New Test of Dixon's Flake Graphite, Specific Heat of Graphite, etc.

The Merchant & Evans Company, a long established metal house of Philadelphia, Pa., have issued a perpetual calendar by which any one can find out how old he is and what day of the week his birthday will occur years ahead. On the covers of the calendar Merchant & Evans metals are very much in evidence.

An interesting price list and table book relating to copper in sheets, plates and rolls is issued by C. G. Hussey & Co., of Pittsburg, Pa. The book contains a number of valuable tables which will save all buyers of copper considerable figuring. The Hussey Mill, which is one of the oldest in the United States, rolls copper in all degrees of thickness down to 4 ounces in sheets and rolls and to any heavier sizes desired.

FIRES

A fire in the plant of the Baum Brass and Model Works, 244 Third avenue, South, Minneapolis, Minn., on March 22 did $3,000 damage, fully covered by insurance. The company is replacing the destroyed portions and is adding equipment to the machine shop. They are in the market for a small power press for stamping 1-16 inch stock about 3 x 6 inches.

ASSOCIATIONS

Among those present at the 156th meeting of the Philadelphia Foundrymen's Association, held at the Manufacturers' Club, Philadelphia, Pa., April 4, were the following: Thomas Devlin and H. O. Evans, Thomas Devlin Manufacturing Company, Philadelphia; C. J. Caley, Russell Irwin Manufacturing Company, New Britain, Conn.; J. R. Bosbyshell, Hamilton Metal Company, Philadelphia, Pa.; W. A. Perrine, Abram Cox Store Company, Philadelphia, Pa.; Howard Evans, J. W. Paxson Company, Philadelphia, Pa.

The eighth annual convention of the National Metal Trades' Association was held March 22 at Cleveland, O. R. M. Downie, Beaver Falls, Pa., read a paper on "Profit Sharing as a Peace and Profit Maker"; and J. H. Gone presented a paper on "The Possibilities of Organization." The most important action of the convention was the passage of a resolution expressing decided disapproval of the bill now under consideration at Washington providing for the adoption of the metric system of weights and measures. The officers elected for the coming year were as follows: President, W. D. Sayle, of Cleveland; vice-president, M. M. Barker, of Boston; second vice-president, F. K. Copeland, of Chicago; secretary and commissioner, Robert Wuest, of Cincinnati. The six new members of the Administrative Board are H. T. Eells, Cleveland; William Taylor, Indianapolis; J. Kirby, Jr., Dayton; C. E. Hildreth, Worcester, Mass.; C. Bingham, Kingston, Ont., and J. Garvin, New York. The place of the next meeting was not decided upon, but will be announced later by the Executive Committee.

PERSONALS

A. L. Goldsmith has been engaged as foundry foreman by The Peck Brothers & Company, New Haven, Conn.

G. O. Thompson has secured a position as foreman plater with the Enterprise Manufacturing Company, Akron, Ohio.

N. Lehman, of the firm of Lehman Bros., metal dealers, smelters and refiners, of Hoboken, N. J., has sailed for a three months trip to Germany.

T. J. McGrath, formerly foreman for the Peck Brothers Company, New Haven, Conn., is now foreman for the P. & F. Corbin Company, New Britain, Conn.

James O. Rodgers, formerly general superintendent of the Lanyou Zinc Company, has been elected president in place of his father, James S. Rodgers, lately deceased.

John D. Fry, who has had ten years brass foundry experience, has become superintendent of the Schwartz department of the Hawley Down Draft Furnace Company of Chicago, Ill., manufacturers of oil fuel furnaces.

Mr. Percy Longmuir, the accomplished metallurgist and metallographist, has removed to Sheffield, England, where he has established a laboratory. Mr. Longmuir's long practical experience with, and theoretical knowledge of, the non-ferrous metals enables him to give the best metallurgical advice.

J. S. MacDonald, formerly superintendent of the W. D. Allen Manufacturing Company, of Chicago, Ill., has been engaged as superintendent of the Hofeller Brass Foundry Co., of Buffalo, N. Y. This foundry is doing a large business in aluminum, bronze and brass castings for automobile work. Their hobby is to turn out difficult work which requires great skill. An interesting piece of work which has just been turned out of their foundry is a large bronze tablet to be used in one of the public libraries. Their foundry equipment is modern. They have recently installed six force-draft Obermayer furnaces.

DEATHS

James S. Rodgers, president of the Lanyon Zinc Company, died April 8 at New York, aged 59. With the exception of an interval of several years previous to 1904 Mr. Rodgers acted as president of the company since its organization in 1899.

Professor Pierre Curie, who jointly with his wife discovered radium and did important research work in radio-activity, was killed by being run over by a wagon in Paris April 19. The metallurgical world at large will regret the loss of this eminent scientist.

NEW YORK, May 1, 1906.

COPPER.—The foreign market for standard copper has been very active. Spot opened at £84, advanced to £85 10s. on the 25th, and price closed at £85 2s. 6d., showing a net advance for the month of £1 2s. 6d.

The home market has ruled very steady all the month with consumers buying freely as far ahead as June and July deliveries. Consumers feel assured that the market is likely to stay around present prices and have covered their requirements. All lines of manufactures are full of orders and consumption is on a heavier scale than ever. The foreign demand has been more active and several large orders have been placed. We quote the market to-day: Lake, May, June delivery, 18¾ to 18⅞c.; Electrolytic, 18⅝ to 18¾c.; casting, prime brands, 18¼ to 18½c.

TIN.—The advance of pig tin in the London market has passed all limits and prices have reached the highest point known. Spot tin opened at £169 10s. and steadily advanced right through the month to £183 10s. and closed at the highest. Towards the close of the month there has been rather more selling of the three months' option and price for that position is about 30s. below the highest.

The New York market has followed the advance abroad, but we have been right along a few points below the cost of importation. The demand has been good and the statistical position of the metal is just as strong as ever it was. The report that tin is being held back at the Straits cannot be confirmed or substantiated in any particular and is not credited in best informed quarters. The market has gone up on the increasing demand and the decreasing supplies. The total visible supply last month was a little over 11,000 tons, against supplies of 15,000 to 25,000 tons a few years back and when the consumption was about 10,000 tons a year less than it is to-day. America to-day is short of tin, we are buying for our immediate wants, no one is carrying heavy stocks of tin at these prices and the consequence is we have to keep buying and so support the market. The spot market to-day for pig tin is 40 cents paid for 5 and 10 ton lots; smaller lots 40.15 to 40.25 cents.

LEAD.—The foreign lead market has ruled steady with prices about 5s. higher for the month.

The leading interest, known as the Lead Trust, for reasons well known to the trade, advanced the price of lead 15 points, from 5.35 to 5.50, but this price does not hold to-day, as the Trust will not name any price and will simply book orders to be shipped at convenience and at whatever price the Trust likes to bill it. Consumers cannot tell what their lead is going to cost. The market to-day is firm, spot lead 5.65 to 5.70. The Trust has no price to-day, but it is pretty certain to be higher than 5.50 new York.

SPELTER.—The foreign market has advances about 30s. during the month.

The New York spelter market has been dull, with a very small consuming demand, and the predictions of higher prices so far have not been realized. At the close the market is firm, 5.95 to 6 cents St. Louis, 6.10 to 6.15 New York, carload lots.

ALUMINUM.—There is still a scarcity of aluminum in all forms, and new metal is only promised for June delivery. With their continued enlargements the manufacturers hope some day to catch up with the market, but it is not probable they will equal consumption for a number of months. Prices are unchanged.

SILVER.—The silver market has ruled very steady with a fair export. Enquiry prices have advanced very little. London silver opened at 29¾d. and closed at 30 7-16d.

OLD METALS.—The market has been fairly active, prices have declined slightly from the highest and buyers have come into the market more freely. Copper and brass scrap is in good demand and brings good prices, the manufacturers of brass are all busy and the demand for scrap is good. Zinc dross has firmed up considerably with a good foreign demand. Price to-day for good slab dross, 4.75, New York, asked.

SHEET COPPER AND BRASS.—The leading rolling mills report good business and consumption on a heavy scale. There has been no change in prices and no change is likely unless ingot copper is put up again.

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.

Advertisements will be inserted under this head at 30 cents per line, 4 lines one dollar, for each insertion. Answers sent in our care will be forwarded.

FOR SALE.

FOR SALE—German Silver Scrap, mostly in the form of sheets, viz.:
14,710 lbs. 10 per cent.;
8,000 lbs. 16 per cent.;
6,339 lbs. 18 per cent. Good clean scrap. Address, stating price offered, GERMAN SILVER SCRAP, care THE METAL INDUSTRY.

FOR SALE—Two Columbia Phonographs for dictating purposes, commonly known as commercial phonographs, and one treadle shaving machine for same, complete, very little used. The above are electric machines. Address PHONO, care THE METAL INDUSTRY.

FOR SALE—BRASS FOUNDRY FLASKS; 75 sets iron flasks, 12 x 15 x 5½, four pins, planed face and back, three pour holes, at $1.50 each for the lot. Address W. GISRIEL & SON, Guilford and Girard Avenues, Baltimore, Md.

FOR SALE.—Shop Rights of the W. R. Swift Vibrator. Latest, cheapest and best vibrator on the market. Suitable for Brass and Iron Foundries. For further particulars address WM. R. SWIFT, 1614 Eyre street, Philadelphia, Pa.

FOR SALE—5 to 10 tons prime remelted SPELTER; also 5,000 pounds TERNE METAL. Quotations upon application. Address P. McLAUGHLIN'S SONS COMPANY, 230-236 North Twelfth street, Brooklyn, N. Y.

HELP WANTED

WANTED for our new shop—First class, experienced monitor hands and brass workers; those accustomed to steam work preferred. Apply at the works of the NATHAN MANUFACTURING COMPANY, 416 East 106th street, New York.

WANTED—A Pompeian or Acid Green FINISHER on gas portable work made from brass and plated metal. Address PORTABLE, care THE METAL INDUSTRY, 61 Beekman street, New York City.

WANTED—Brass foundry foreman to go to Mexico to take full charge of brass foundry making brass valves, and to teach native help numbering about ten men. Address MEXICO, care THE METAL INDUSTRY.

WANTED—Foreman for Mexican brass finishing shop making valves; will have full charge of shop and is to teach native help numbering about 15 men. Address MEXICO, care THE METAL INDUSTRY.

WANTED—A young man who understands the general line of nickel, brass and silver plating. State references, ability and terms in application. Address A. L. FRINK, 747 Prescott ave., Scranton, Pa.

WANTED—An expert TINSMITH capable of making the most difficult square and hexagonal pieces for chandelier work. Give experience and wages wanted. Address TINSMITH, care THE METAL INDUSTRY.

WANTED—An expert METAL SPINNER, capable of spinning the most difficult chandelier work. Give experience and wages wanted. Address SPINNER, care THE METAL INDUSTRY.

SITUATIONS WANTED.

(Persons answering advertisements under this head should state whether they desire position in Brass or Iron Foundry, their specific branch of Plating or Finishing, etc.)

SITUATION WANTED by PLATER who understands all kinds of solutions, also galvano-plastic work on lace, glass, wood, pottery. Address PLATER, care THE METAL INDUSTRY.

MISCELLANEOUS WANTS.

WANTED.—The present address of a plater named FRANK NOVOTNY, a Bohemian or some other central European native, aged about 40. Address THE METAL INDUSTRY.

CASH PAID for old precious metals and minerals in any form. Gas mantle dust, bronze powder, bismuth, platinum, mercury, nickel, etc. Address JOSEF RADNAI, 32 Fulton street, New York City.

INFORMATION BUREAU

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds. Send for circular.

OFFICE HEADQUARTERS.

When visiting New York, the out-of-town friends of THE METAL INDUSTRY are invited to make our office their headquarters, where a writing desk and telephone service will be at their disposal. Every one interested in the non-ferrous metals and alloys is invited to call.

Metal Prices, May 2, 1906

METALS.	Price per lb.
COPPER, PIG, BAR AND INGOT AND OLD COPPER	
Duty Free. Manufactured 2½c. per lb.	
Lake, car load lots	18.75
Electrolytic, car load lots	18.60
Casting, car load lots	18.25
TIN—Duty Free.	
Straits of Malacca, car load lots	40.00
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead, car load lots	5.65
SPELTER—Duty 1½c. per lb.	
Western car load lots	6.15
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	38.00
100 lb lots	36.00
Ton lots	35.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons, cask lots	24.00
Hallets, cask lots	22.50
Other, cask lots	22.25
NICKEL—Duty 6c. per lb.	
Large lots	.45 to .50
Small lots	.50 to .65
MANGANESE—Duty 20%	.75
MAGNESIUM—Duty Free	$1.50 to $1.75
BISMUTH—Duty Free	1.50 to 1.60
CADMIUM—Duty Free	.95 to 1.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	.42
Small lots	.50 to .75
	Price per oz.
GOLD—Duty Free	$20.67
SILVER—Duty Free	.64
PLATINUM—Duty Free	24.00
QUICKSILVER—Duty 7c. per lb. Price per Flask	41.00

OLD METALS.		Price per lb.
Heavy Cut Copper	17.00	17.50
Copper Wire	16.00	17.00
Light Copper	15.00	15.50
Heavy Mach. Comp	15.00	15.50
Heavy Brass	11.00	12.00
Light Brass	9.00	10.25
No. 1 Yellow Brass Turnings	10.00	11.00
No. 1 Comp. Turnings	12.00	13.50
Heavy Lead	5.10	5.20
Zinc Scrap	4.50	5.00
Scrap Aluminum, sheet, pure	25.00	29.00
Scrap Aluminum, cast, alloyed	20.00	25.00
Scrap Aluminum, turnings	10.00	12.00
Old Nickel	15.00	25.00
No. 1 Pewter	26.00	27.00

	Price per lb.
SILICON COPPER, according to quantity	.36 to .38
PHOSPHOR COPPER, 5%	.24 to .26
Phosphor Tin	.45 to .46
Brass Ingot, Yellow	.13 to .14
Brass Ingot, Red	.15 to .18
Bronze Ingot	.16 to .17
Manganese Bronze	.20 to .21
Phosphor Bronze	.20 to .21

ZINC—Duty, sheet, 2c. per lb.	Price per lb.
600 lb. casks	8.50
Open casks	9.00

PRICES OF SHEET COPPER.

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 16oz. 11 to 12½ lb. sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	23	23	23	23	23	24
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	23	23	24
	Longer than 96 ins.	23	23	23	24	23	25
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	23	23	23	23	23	25
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	23	23	25
	Longer than 96 ins. Not longer than 120 ins.	23	23	23	23	24	26
	Longer than 120 ins.	23	23	23	24	25	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	23	23	23	24	25	27
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	24	26	28
	Longer than 96 ins. Not longer than 120 ins.	23	23	23	25	27	31
	Longer than 120 ins.	23	23	24	26	29	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	23	23	23	24	26	29
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	25	27	32
	Longer than 96 ins. Not longer than 120 ins.	23	23	24	26	29	
	Longer than 120 ins.	24	24	25	27	31	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	23	23	24	26	31	
	Longer than 96 ins. Not longer than 120 ins.	23	23	25	28	33	
	Longer than 120 ins.	24	24	26	31		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	24	24	26	29		
	Longer than 96 ins. Not longer than 120 ins.	25	25	27	30		
	Longer than 120 ins.	26	26	28	32		
Wider than 108 ins.	Not longer than 132 ins.	27	27	29			
	Longer than 132 ins.	28	28	31			

Rolled Round Copper, ⅝ inch diameter or over, 23 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, May 2, 1906

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb.....27c.
12 oz. and up to 14 oz. to square foot, per lb.....28c.
10 oz. and up to 12 oz.....30c.
Lighter than 10 oz.....33c.
Circle less than 8 in. diam., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS.

Prices are for 100 lbs. or more of Sheet Metal in one order.

Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from list 17½ per cent.

PRICE LIST FOR BRASS AND COPPER WIRE.

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass.	Low Brass.	Gilding Bronze and Copper.
All Nos. to No. 10, Inc.....	$0.23	$0.27	$0.28
Above No. 10 to No. 16.....	.23½	.27½	.28½
Nos. 17 and 18.....	.24	.28	.32
" 19 and 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
" 22.....	.27	.31	.35
" 23.....	.28	.32	.36
" 24.....	.30	.34	.38

Discount, Brass Wire, 15 and 2½ per cent.; Copper Wire, 15 and 2½ per cent.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 3½ in. O. D. Nos. 4 to 13 Stubs Gauge, 22c. per lb.
Seamless Copper Tubing, 25c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb..	30	29	24	23	22	22	22	22	22	22	22	23	24	26	28	29

BRAZED BRASS TUBING.

Brown & Sharpe's Gauge the Standard.

	Per lb.
Plain Round Tube, ⅜ in. up to 2 in., to No. 19, inc.....	$0.35
" " " ⅜ " " ¾ " " " 19, "	.36
" " " ½ " " ⅝ " " " 19, "	.38
" " " ⅝ " " ½ " " " 19, "	.41
" " " ¾ " " ⅝ " " " 19, "	.48
" " " ⅛ " " ¾ " " " 19, "	.65
" " " ¼ " " ⅛ " " " 19, "	1.00
" " " ⅛ " " ¼ " " " 19, "	1.50
Smaller than ⅛ inch.....	Special
2 inch to 3 inch, to No. 19, inclusive.....	.38
3 inch	.40
Over 3 inch to 3½ inch.....	.45
Over 3½ inch.....	.50

Bronze and copper advance 3 cents. Discount 25 and 5 per cent.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and including	*3in. .. 12in. in coils.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.	Cutting to Length.	Polishing or Satin Finishing one Side.
W. 13 and heavier..	44	44	46	46	46	46	49	49	49	1	2
" 14.....	44	44	46	46	46	46	49	49	49	1	2
" 15.....	44	44	46	46	46	46	49	49	49	1	2
" 16.....	44	44	46	46	46	46	49	49	49	1	2
" 17.....	44	44	46	46	46	46	49	49	49	1	3
" 18.....	44	44	46	46	46	46	49	49	52	1	3
" 19.....	44	44	46	46	46	46	49	50	53	1	4
" 20.....	44	46	46	46	46	48	51	52	54	1	4
" 21.....	44	48	48	48	48	50	53	54	60	2	5
" 22.....	44	48	48	48	50	50	53	57	61	2	5
" 23.....	44	48	48	48	50	50	53	59	62	2	6
" 24.....	44	48	50	52	52	52	55	61	64	2	6
" 25.....	46	49	51	53	53	53	56	63	67	2	7
" 26.....	46	49	52	56	56	56	61	65	71	2	8
" 27.....	46	50	54	58	58	59	64	68	74	2	10
" 28.....	46	50	56	58	59	59	66	72	77	2	11
" 29.....	48	51	58	60	62	62	71	77	82	2	13
" 30.....	48	52	60	62	66	72	79	82	87	2	15
" 31.....	50	54	62	65	70	78	81	84	90	3	17
" 32.....	52	56	64	68	76	84	91	97	102	3	19
" 33.....	54	58	67	72	80	91	98	107	117	3	21
" 34.....	57	62	69	77	85	98	110	117	127	3	25
" 35.....	..	72	77	87	97	107	122	132	..	..	..*
" 36.....	..	87	97	107	122	127	142	..	..	..	..
" 37.....	..	102	112	127	142	157	172	..	..	..	..
" 38.....	..	122	137	152	167	182	202	..	..	..	..
" 39.....	..	142	162	182	202	222	..	..	..	..	..
" 40.....	..	172	202	222	242	..	..	..	..	..	..

*Polished or scratch brushed 2 sides, double above prices.

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

Stubs' G.	¼"	⅜"	½"	⅝"	¾"	1"	1½"	2"	2½"	2¾"
4 to 11....	..	..	96	86	83	77	67	61	61	61
12.....	..	1.08	96	86	83	77	67	61	61	61
13.....	..	1.08	96	86	83	77	67	64	64	64
14.....	..	1.08	96	86	83	77	67	64	64	64
15.....	..	1.12	96	89	86	80	70	67	67	67
16.....	..	1.15	99	93	89	83	70	70	70	70
17.....	..	1.18	1.02	96	93	86	73	73	73	73
18.....	1.85	1.24	1.05	99	93	86	77	77	77	80
19.....	1.88	1.28	1.08	1.02	99	93	83	80	80	83
20.....	1.95	1.31	1.15	1.08	1.05	99	89	86	86	89
21.....	2.01	1.37	1.21	1.15	1.12	1.05	99	93	93	96
22.....	2.17	1.44	1.24	1.18	1.15	1.08	1.05	99	1.05	1.05
23.....	2.33	1.50	1.31	1.24	1.21	1.15	1.15	1.08	1.15	1.15
24.....	2.48	1.60	1.37	1.31	1.28	1.18	1.21	1.21	1.24	..
25.....	2.65	1.69	1.47	1.37	1.34	1.28	1.34	..	..	..

Prices are for lots of 50 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B. & S. G'ge.	0000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	40	40½	40½	41	41½	42	42½	43	44	45	46	49	54

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12.....	$0.52	16.....	.58
13.....	.53	17.....	.59
14.....	.54	18.....	.60
15.....	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50 per cent.

Munts or Yellow Metal Sheathing (14" x 48") .....18c. lb. net base.
" " " Rectangular Sheets other than Sheathing ....20c. " " "
" " " Rod ....19c. " " "
Tobin Bronze Rod..... ... .21c. " " "
Above are for 100 lbs. or more in one order.